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SMITHSONIAN INSTITUTION
BUREAU OF AMERICAN ETHNOLOGY
BULLETIN 166

Inter-Agency Archeological Salvage Program

RIVER BASIN SURVEYS PAPERS

No. 8.—EXCAVATIONS IN THE McNARY RESERVOIR BASIN NEAR UMATILLA, OREGON, by DOUGLAS OSBORNE

WITH APPENDIXES

By MARSHALL T. NEWMAN, ARTHUR WOODWARD, W. J. KROLL and B. H. McLEOD

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LETTER OF TRANSMITTAL

Smithsonian Institution,
Bureau of American Ethnology,
Washington, D. C., March 29, 1956.

Sir: I have the honor to submit the accompanying manuscript, entitled "Excavations in the McNary Reservoir Basin near Umatilla, Oregon, by Douglas Osborne", which is to be No. 8 of the River Basin Surveys Papers, and to recommend that it be published as a bulletin of the Bureau of American Ethnology.

Very respectfully yours,

M. W. Stirling,
Director.

Dr. Leonard Carmichael,
Secretary, Smithsonian Institution.

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EXPLANATION OF THE INTER-AGENCY ARCHEOLOGICAL SALVAGE PROGRAM

The Inter-Agency Archeological Salvage Program is a cooperative plan of the Smithsonian Institution; the National Park Service and the Bureau of Reclamation, Department of the Interior; and the Corps of Engineers, Department of the Army. It was formulated, through a series of interbureau agreements, for the purpose of recovering archeological and paleontological remains which would otherwise be lost as a result of the numerous projects for flood control, irrigation, hydroelectric power, and navigation improvements in the river basins of the United States. Various State and local agencies have assisted in the work. To carry out its part of the joint undertaking, the Smithsonian Institution organized the River Basin Surveys as a unit of the Bureau of American Ethnology. The National Park Service has served as liaison between the various agencies and has provided the Smithsonian Institution with all of the necessary information pertaining to the location of proposed dams and other construction and their priorities. It has also had responsibility for budgeting costs of the program, funds for which are provided in the annual Department of the Interior appropriations. The operations of the River Basin Surveys, Smithsonian Institution, have been supported by funds transferred to it from the National Park Service. Through agreements with the National Park Service, money has also been made available to State and local agencies to supplement their own resources and aid them in their contributions to the program.

Frank H. H. Roberts, Jr.,
Director, River Basin Surveys.

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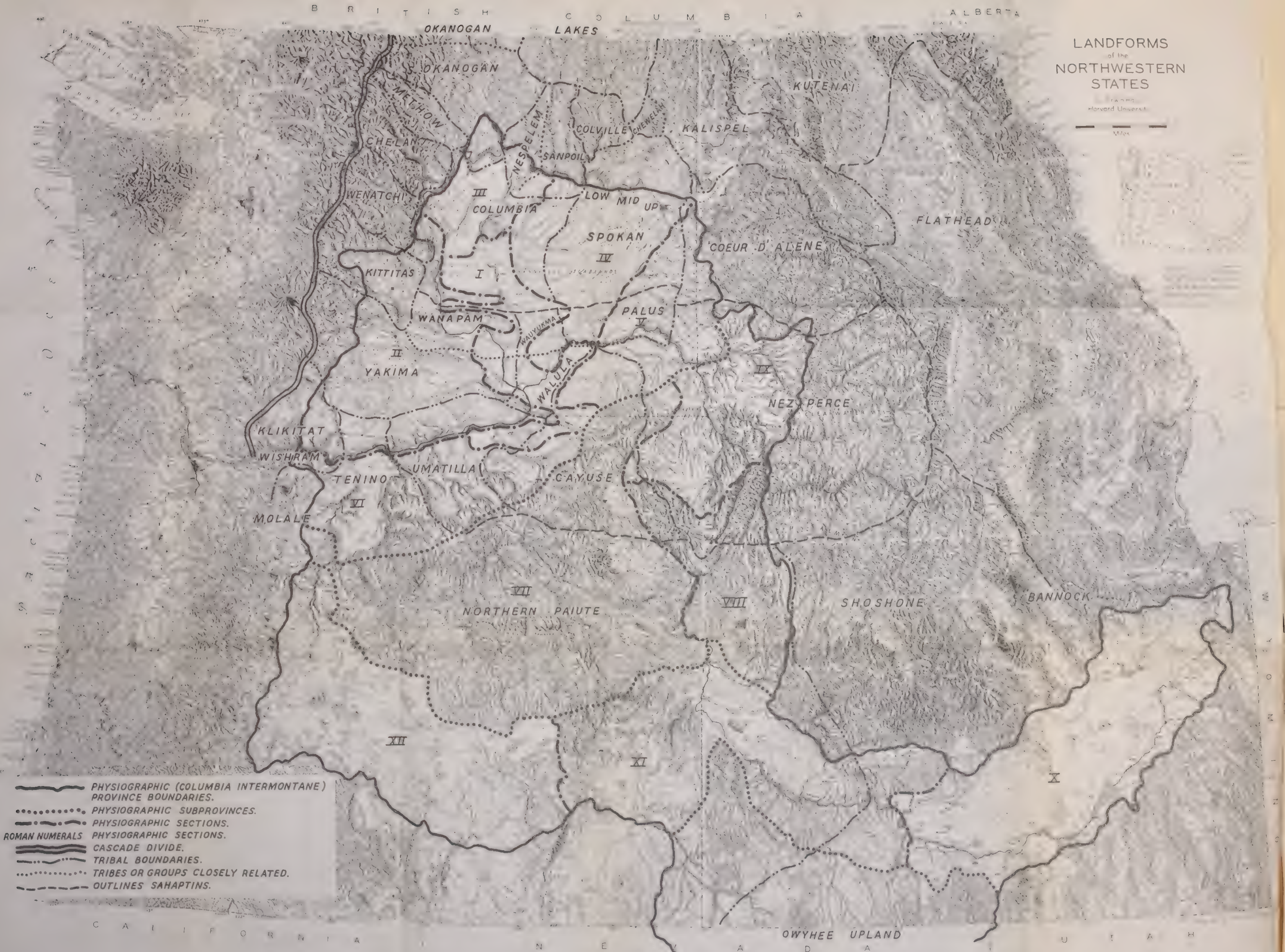
BRITISH COLUMBIA
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LANDFORMS of the NORTHWESTERN STATES
Harvard University
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LAKES
OKANOGAN
METHOW
CHELAN
NESPELEM
SANPOIL
COLVILLE
CHEWELAH
KALISPEL
KUTENAI
WENATCHI
III
COLUMBIA
LOW
MID
UP
SPOKAN
IV
FLATHEAD
COEUR D'ALENE
KITTITAS
I
WANAPAM
WAUYUKMA
PALUS
V
II
YAKIMA
WALULA
IX
NEZ PERCE
KLIKITAT
WISHRAM
TENINO
UMATILLA
CAYUSE
VI
MOLALE
VII
NORTHERN PAIUTE
VIII
SHOSHONE
BANNOCK
XII
XI
X
PACIFIC OCEAN
WYOMING
CALIFORNIA
NEVADA
UTAH
OWYHEE UPLAND
PHYSIOGRAPHIC (COLUMBIA INTERMONTANE) PROVINCE BOUNDARIES.
PHYSIOGRAPHIC SUBPROVINCES.
PHYSIOGRAPHIC SECTIONS.
ROMAN NUMERALS PHYSIOGRAPHIC SECTIONS.
CASCADE DIVIDE.
TRIBAL BOUNDARIES.
TRIBES OR GROUPS CLOSELY RELATED.
OUTLINES SAHAPTINS.

Map 1.—Tribal locations and physiography of Columbia Intermontane Province or Columbia Plateaus

Columbia Basin Subprovince
- I. Central Plains section
- II. Yakima Folds section
- III. Waterville Plateau section
- IV. Channeled Scablands section
- V. Palouse Hills section
- VI. North Central Oregon Plateau section

Central Mountains Subprovince
- VII. Blue Mountains section
- VIII. Wallowa-Seven Devils section
- IX. Tri-State Slopes section

High Lava Plains Subprovince
- X. Snake River Plain section
- XI. Malheur-Boise Basin section
- XII. Harney-High Desert section
  Owyhee Upland section

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EXCAVATIONS IN THE McNARY RESERVOIR BASIN NEAR UMATILLA, OREGON[1]

By Douglas Osborne

INTRODUCTION

The archeological sites described herein were excavated during August and early September of 1948 in the McNary Reservoir, as part of the River Basin Surveys' program for the salvage of scientific and historic remains from areas to be flooded by the dams being built or to be built by the Corps of Engineers, Department of the Army, and the Bureau of Reclamation, Department of the Interior. McNary Reservoir itself will occupy the Columbia River from Umatilla, Oreg., up to some 12 miles beyond Pasco, Wash., and will also extend up the Snake River about 8 miles. Two sites are reported herein.

The burial site, 45–BN–3,[2] had a fair midden and had, apparently as recently as before the great 1948 flood, shown evidence of house pits. It is located on the north (Washington) side of the Columbia River at Berrian's Island. This island is some 9 miles above Plymouth, Wash. Another 1½ miles above 45–BN–3 is 45–BN–53, a large pit-house village.

All labor was done by students paid from the funds appropriated for archeological excavations in the McNary Reservoir. Equipment was purchased or rented with the same funds. Although mentioned in the acknowledgments, it should be further stated here that much aid in both man-hours and the use of material was given by the local office of the Army Engineers. This included the use of the ferry, surveying instruments, and the short loan of a surveying crew, etc. The material was studied in the River Basin Surveys' laboratory on the campus of the University of Oregon, Eugene.

Table 1 gives a statistical presentation of the field work done and the results.

---

[1] Submitted December 1953.

[2] River Basin Surveys employs a trinomial system of site designation. The first element represents the State in alphabetical position (45=Washington), the second is a county designation (BN=Benton), and the third is usually the survey sequence number of the site.

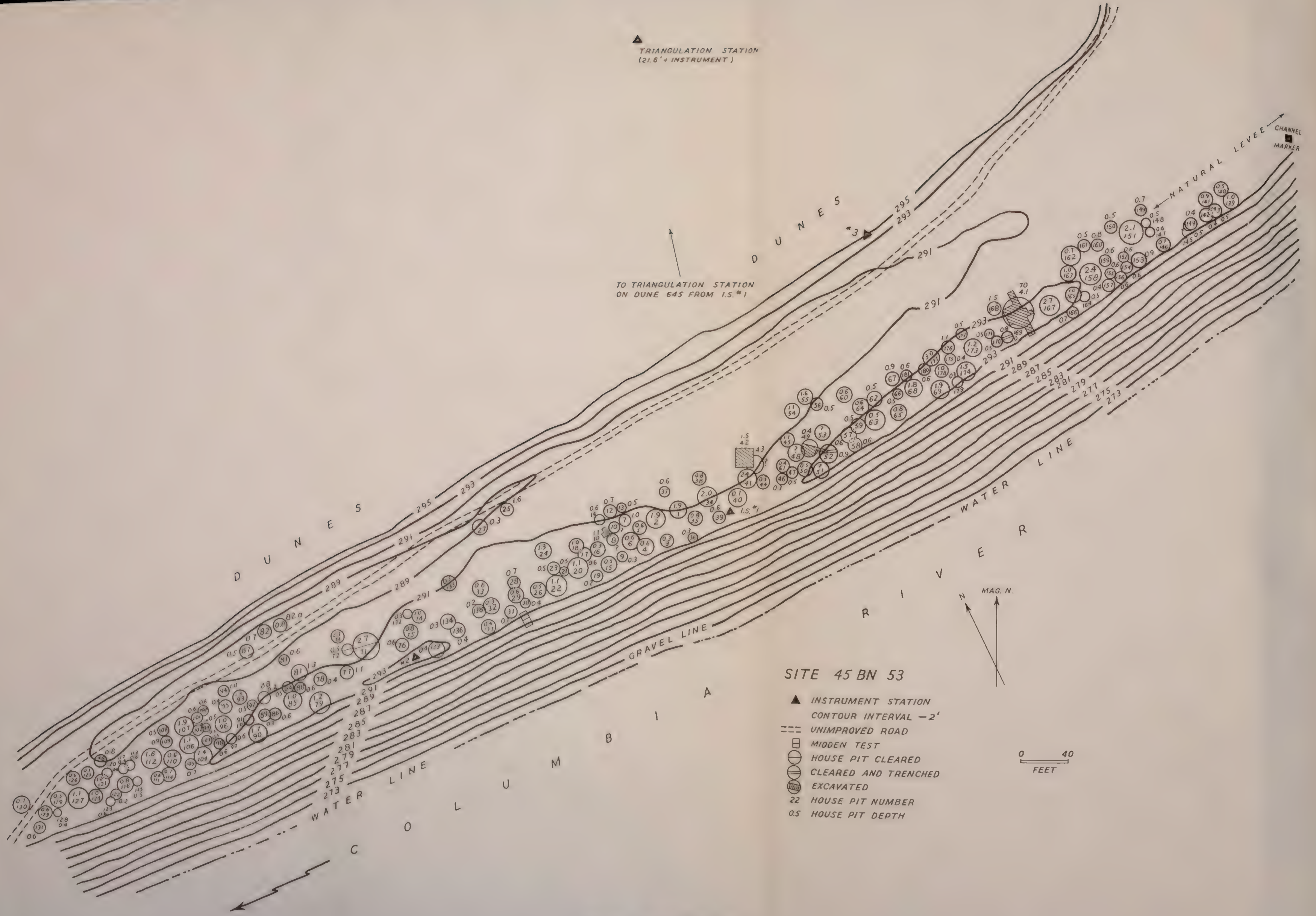
TABLE 1.—*Excavation statistics*

Site	Man-days	Cubic yards moved	Burials removed	Artifacts recovered	Structures excavated
45-BN-3	194	946.6	48	1,650	10 features or grave cists.
45-BN-53	92	554.7	----------	210	6 house pits (plus 4 cleared).
35-UM-8 (test)	16	166.7	----------	10	

ACKNOWLEDGMENTS

An archeological report is often no better than the extra-archeological experts who gave of their time and knowledge to the many problems involved. The following aided with this report, and my gratitude to them is great. Animal bones: Dr. Theodore E. White, paleontologist, River Basin Surveys. Bird bones: Dr. Alexander Wetmore, Smithsonian Institution. Buttons: Mr. Hermann W. Williams, Corcoran Gallery of Art, Washington, D. C.; Mrs. R. D. Busey, Mrs. J. F. Flock, Oregon State Button Society, Eugene. Copper analysis: Dr. W. J. Kroll, United States Bureau of Mines, Albany, Oreg.; Mr. B. H. McLeod, 64 Waterford Lane, Stamford, Conn. Copper and brass descriptions: Mr. Lester Petersen, Industrial Sheet Metal & Blower Co., Eugene, Oreg. Cord, tensile tests: Mr. H. Y. Jennings, Dan River Mills, Danville, Va. Petrological specimens: Drs. Lloyd W. Staples and E. M. Baldwin, department of geology, University of Oregon. Plant remains: Dr. Leroy E. Detling, Museum of Natural History, University of Oregon. Porcelain: Mr. Theodore Y. Hobby, Metropolitan Museum of Art, New York; Mr. Gregor Norman Wilcox, Los Angeles County Museum, Los Angeles. Pumice: Dr. Ira S. Allison, Oregon State College, Corvallis. Shells: Drs. Harald A. Rehder and Joseph E. P. Morrison, United States National Museum. Silver tests: Dr. J. M. McGee, University of Oregon. Soils: Dr. W. L. Powers, Oregon State College, Corvallis. Pollen check: Dr. H. P. Hansen, Oregon State College, Corvallis. Analysis of perishables, photographic work, and generally wholesale noncompartmented assistance: Carolyn M. Osborne, Seattle, Wash. Trade goods: Mr. Arthur Woodward, Los Angeles County Museum, Los Angeles, Calif. Drafting: Maureen Connors, University of Washington. Messrs. Davis, Watson, and McClintick of the Army Engineers, Umatilla, took a personal interest in our problems.

The area was surveyed by Franklin Fenenga and Clarence E. Smith, Jr. Loyd Collins and Hiroto Zakoji were office assistants. Drs. Frank H. H. Roberts, Jr., Philip Drucker, and Luther S. Cressman aided in all of the many ways that cordial and understanding experts can aid beginners. The material was taken from the earth by 13 men from various west-coast universities. They were good dirt archeologists all.


TRIANGULATION STATION
(21.6' + INSTRUMENT)
TO TRIANGULATION STATION ON DUNE 645 FROM I.S. #1
DUNES
DUNES
NATURAL LEVEE
CHANNEL MARKER
COLUMBIA RIVER
WATER LINE
WATER LINE
GRAVEL LINE
I.S. #1
#2
#3
N
MAG. N.
SITE 45 BN 53
INSTRUMENT STATION
CONTOUR INTERVAL — 2'
UNIMPROVED ROAD
MIDDEN TEST
HOUSE PIT CLEARED
CLEARED AND TRENCHED
EXCAVATED
22 HOUSE PIT NUMBER
0.5 HOUSE PIT DEPTH
0 40
FEET

Map 2.—Site 45–BN–53.

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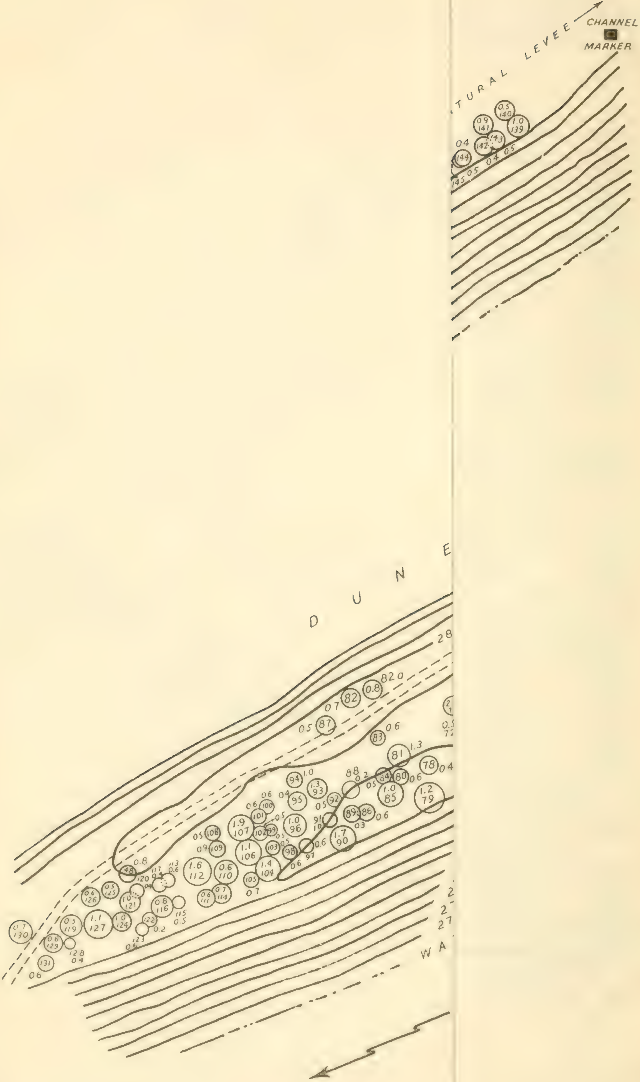
CHANNEL MARKER
TURAL LEVEE
D U N E
W A
140
141
139
142
143
144
145
82
82a
87
83
81
78
80
84
85
79
94
93
95
92
89
86
96
91
90
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101
107
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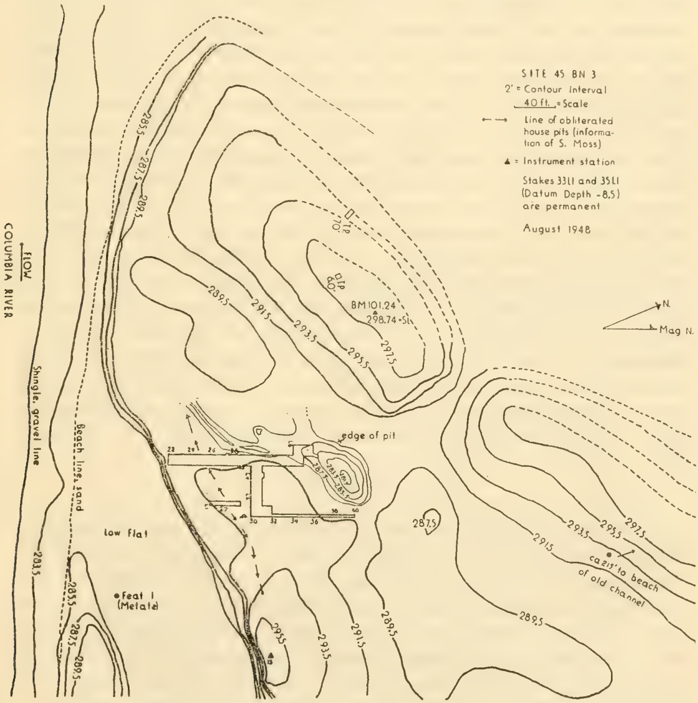
129
131
122
116
115
123
128
28
27

380923 O—57 (Face p. 3)

The material in this report, through permission of the Smithsonian Institution, was used in a different form in partial fulfillment of the requirements for a doctorate at the University of California. My thesis committee, Profs. R. F. Heizer (chairman), E. W. Gifford, and D. Mandelbaum, made many helpful suggestions. Drs. Verne F. Ray and William W. Elmendorf, University of Washington, read the report as Plateau ethnologists.

THE SITES

An understanding of the type and form of both midden and natural deposits is necessary to both the interpretation of a site and to the intelligent use of that interpretation. An examination of the profiles (map 4) and the site maps (maps 2 and 3) will be necessary for an adequate comprehension of the following.


SITE 45 BN 3
2' = Contour interval
40 ft. = Scale
line of obliterated house pits (information of S. Moss)
▲ = Instrument station
Stakes 33L1 and 35L1 (Datum Depth -8.5) are permanent
August 1948
N.
Mag N.
COLUMBIA RIVER
flow
Shingle, gravel line
Beach line, sand
low flat
Feat 1 (Metate)
edge of pit
BM 101.24
298.74 - St.
ca 2.15' to beach of old channel
283.5
285.5
287.5
289.5
291.5
293.5
295.5
297.5
22
24
26
28
30
32
34
36
38
40
dip 60°
dip 70°

Map 3.—Site 45–BN–3.

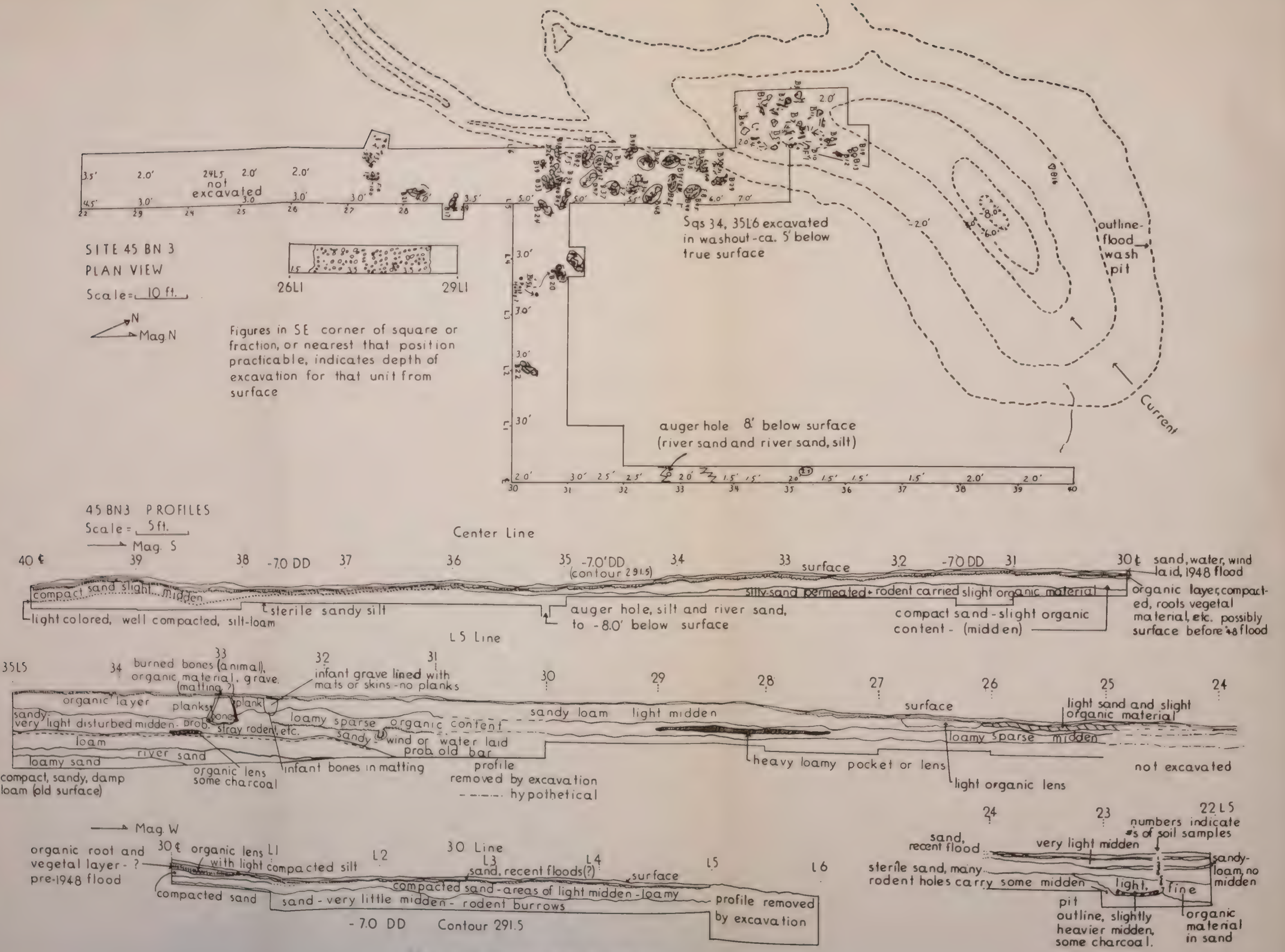
45–BN–53

This site was excavated in much the same manner as 45–BN–3, described below. Each house pit or adjacent pair of pits was treated as a separate excavation and was staked accordingly in 5-foot squares, using the grid system as described for 45–BN–3. Because of the size of the site, three permanent stations for our telescopic alidade were needed. These were tied together and a level was run to a nearby triangulation station. This, then, tied our stations and the contour map made from them, into the survey of the Army Engineers. Vertical measurements were made from the alidade station here as with 45–BN–3.

Search at this site revealed only two concentrations of midden worthy of the name: in the house pits and along the beginning of the slope from the natural levee down to the river in the lower third of the site. A test of two 10-foot squares was made in the latter. Remarks on the former appear in the discussion of structures. As can be seen on the profile (map 7), the first square was only partial because of the bank slope. In the second there were three slightly differing layers; they do not deserve the designation of strata. The midden, while extremely light throughout, was heavier nearer the river and became less so as the face of the trench progressed landward. There is also to be noted on the profile a slope of the lower layer down toward the river. The upper does not do so on the profile sketched but did level off on the opposite side of the trench. Therefore it is a safe deduction that the levels of dump sloped down to the river. The obvious conclusion is that some of the midden from this site was dumped over the river bank and was thus washed away. The bottom of the cut followed in nearly completely sterile sand. Material collected (the midden was screened) does not vary from top to bottom. Mussel shells, charcoal, numerous flint and chert spalls and animal bones, largely small rodents, was the sum of the results of this screening. The bottom of the first loam layer or stratum was the most productive.

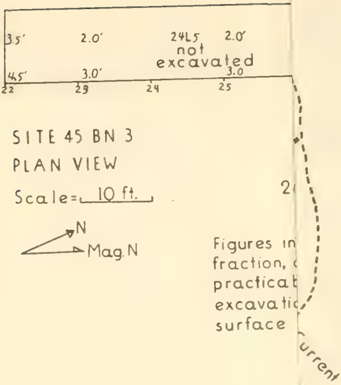
45–BN–3

The large pit, washed out of the soft sand along the northern and western periphery of the site, gave a fairly adequate cross section of the deposit there and, at the same time, exposed the cemetery (pl. 3, *a*). While salvage work was proceeding among the better skeletal remnants along the southern (downstream) lip of the pit, a 3-foot-wide test trench was opened along a magnetic north-south line to the east of the pit. The trench was placed so that its northern end would approach the low area that led the current through and caused the washed-out pit. The stakes were at 10-foot intervals, giving 10-foot


SITE 45 BN 3
PLAN VIEW
Scale = 10 ft.
N
Mag. N
24L5 not excavated
26L1
29L1
Figures in SE corner of square or fraction, or nearest that position practicable, indicates depth of excavation for that unit from surface
Sqs 34, 35L6 excavated in washout - ca. 5' below true surface
outline - flood wash pit
Current
auger hole 8' below surface (river sand and river sand, silt)
45 BN3 PROFILES
Scale = 5 ft.
Mag. S
Center Line
40 ℄
39
38
-7.0 DD
37
36
35
-7.0'DD (contour 291.5)
34
33
surface
32
-7.0 DD
31
30 ℄
sand, water, wind laid, 1948 flood
compact sand slight midden
light colored, well compacted, silt-loam
sterile sandy silt
auger hole, silt and river sand, to -8.0' below surface
silty sand permeated - rodent carried slight organic material
compact sand - slight organic content - (midden)
organic layer, compacted, roots vegetal material, etc. possibly surface before '48 flood
L5 Line
35L5
34
33
burned bones (animal), organic material, grave. (matting ?)
32
infant grave lined with mats or skins - no planks
31
30
29
28
27
26
25
24
organic layer
planks
plank
bone
sandy - very light disturbed midden - prob. stray rodent, etc.
loamy sparse organic content
sandy loam
light midden
surface
light sand and slight organic material
loam
river sand
sandy wind or water laid prob. old bar
loamy sparse midden
loamy sand
compact, sandy, damp loam (old surface)
organic lens some charcoal
infant bones in matting
profile removed by excavation
- - -.- hypothetical
heavy loamy pocket or lens
light organic lens
not excavated
Mag. W
30 Line
30 ℄
L1
L2
L3
L4
L5
L6
organic root and vegetal layer - ? pre-1948 flood
organic lens with light compacted silt
sand, recent floods(?)
surface
compacted sand
compacted sand - areas of light midden - loamy
sand - very little midden - rodent burrows
profile removed by excavation
-7.0 DD
Contour 291.5
24
23
22L5
numbers indicate #s of soil samples
sand, recent flood
very light midden
sandy-loam, no midden
sterile sand, many rodent holes carry some midden
light
fine
pit outline, slightly heavier midden, some charcoal.
organic material in sand

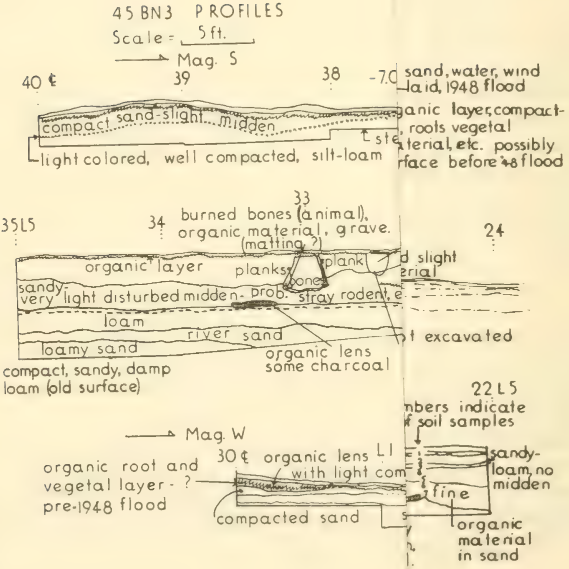
MAP 4.—Plans and profiles, 45–BN–3.

380923 O-57 (Face p. 5)



SITE 45 BN 3
PLAN VIEW
Scale= 10 ft.

3.5'
2.0'
24L5
2.0'
not excavated
4.5'
3.0'
3.0
22
23
24
25
2(
N
Mag. N
Figures in
fraction, c
practicat
excavatic
surface
current



45 BN3 PROFILES
Scale = 5 ft.

Mag. S
40 ¢
39
38
-7.0
sand, water, wind laid, 1948 flood
ganic layer, compact-
, roots vegetal
terial, etc. possibly
rface before '48 flood
compact sand-slight midden
ste
light colored, well compacted, silt-loam
33
35L5
34
burned bones (animal), organic material, grave.
(matting ?)
24
organic layer
planks
bones
plank
d slight
erial
sandy-
very light disturbed midden- prob. stray rodent, e
loam
river sand
t excavated
loamy sand
organic lens
some charcoal
compact, sandy, damp loam (old surface)
22 L5
nbers indicate
f soil samples
Mag. W
30 ¢
organic lens
L1
with light com
organic root and vegetal layer - ? pre-1948 flood
sandy-loam, no midden
fine
compacted sand
organic material in sand

squares, and were numbered consecutively beginning at 30. This line thus became the centerline of the grid. According to this system, then, stakes to the right or left of the centerline (c/L) are designated by the centerline stake in their row, an R or L for right or left, and a third unit which is the stake number from c/L. Thus 30L5 is 50 feet (5 stakes) to the left or west of stake 30 c/L. A square is designated following the stake at the southeastern corner. The grid was laid out and occasionally corrected with a telescopic alidade or Brunton compass.

The alidade was set permanently on stakes driven into the ground and used as the vertical control, as the 10-foot grid was the horizontal. All artifacts, burials, and features were placed vertically (minus datum depth, —DD) from the permanent alidade setting. This was then tied into a nearby benchmark and the contour map was made from the same station. The site maps, profiles, etc., could then be read in relation to the surveys of the United States Geodetic Survey and Army Engineers. Such instrument control is greatly to be desired, as it eliminates the errors so easily made when constructing long profiles.

The following section should be read with reference to the profiles (map 4). The soil at 45–BN–3 was sandy and sandy loam. The upper 2 feet were, over a part of the site, nearly pure sand plus light midden. There was no drastic change in the soil, horizontally speaking, and even the vertical changes were more a matter of gradation in midden or in loaminess than in actual soil type.

The sandy surface supported a sparse growth of grass, sagebrush, and weeds. Immediately below the first few inches of clean white sand was invariably a thin layer of humic and often turfy soil. The clean sand on top I believe to have been deposited by the 1948 flood or to be the result of postflood wind deposition (always a powerful factor in the area) which was given a good deal of impetus by the flood when the latter stripped the scanty vegetal cover from parts of the area. The turfy organic layer is probably preflood surface.

Below this a layer of moderately compact sandy loam (which is far more sandy than loamy) extends from 1 to 2 feet beneath the surface. By most standards the midden in this layer would be called light. It was, however, the most concentrated found at the site—with the exception of one or two small areas which were either pits or received regular dumpings of household debris. In the eastern part of the dig as shown on the c/L and part of the 30-line profiles this upper sandy layer was the only one with cultural material definitely in situ. Soil samples were taken and have been examined by Dr. H. P. Hansen, of Oregon State College, Corvallis, particularly for pollen and other organic remains. The loam soil, partly water deposited and often largely windblown, yielded no information in these categories.

As the trenches expanded west and along the L3 line where they were cut tangent to the washout pit and south to the edge of the natural levee, better and deeper cultural deposits were found. The upper layer still contained the most midden and it was still light, but there had been an increase over the eastern part of the site and there was very light midden, with occasional pockets, lenses or small layers of charcoal or organic-stained soil below the first layer. This, the second layer, was about 2 feet deep at 35L5 and pinched down, gradually, toward the river. It widened slightly at the beginning of the bank slope to the water's edge—a function of the dumping which apparently took place over the bank. Below this second layer, at the upper (35L5) end of the long central profile, is an older surface. It is marked by a line of damp and compact sandy loam. Below this are three levels of loam, river sand, and loamy sand, respectively. They are fairly level for a short distance and then slope quickly downward toward the river. They are, of course, strata deposited on an old riverbank, bar, or island surface. All were sterile. The burials, found resting on these strata, or at their level and on the washed-out pit were all disturbed.

On the profile I have shown all layers as separated by dark lines. This is, of course, an exaggeration of the abruptness of the breaks. There was, however, usually an actual change discernible within a tenth of a foot or slightly more. In squares 32 and 31L5 was an organic layer, which, for a short space, bisected the second layer. It had every appearance of being the remaining fragment of an old surface similar to the preflood surface. A small pit, midway between 31 and 33 on the L5 line, originated at this level. It was sterile. In the same layer were found other loamy lenses which carried a charcoal or other organic content—an indication of their near-surface origin.

It is obvious, from the profiles, that the squares along the L5 line, from about 26 or 27 to the end, were the best endowed with midden, organic remains, and general complexity. In general, this was the area of the best artifact yields. Here, too, the burials were concentrated. The sole exception to these remarks is square 28L5. The excavation of this square passed through the over-the-bank dump. Although organic material was prominent throughout, there was a scant artifact yield. The Indians of 45–BN–3 watched their sweepings well. No burials were located south of 27L5.

Fortunately (or unfortunately) two graves were found when the profile was being dressed down. Consequently the L5 profile was cut back about 6 inches at this place in order to get, at the same time, a profile of the graves on the long profile through the site. These graves are obviously late. They originate just below the turfy preflood surface. The one beneath stake 33L5 was a typical plank-cist grave. The thin planks came down on each side to surround the bones. There were matting on the bottom of the grave and the evidence of a hot fire at the top. A number of burned bones were found amid the ashes.

The infant's grave was shallower and, not having been lined with rigid material (hides or mats were used), lacked the conical shape. The bones were wrapped in matting and lay in the bottom of the pit.

It might be worthwhile to add here that an auger hole in square 35 c/L, which was driven 8 feet below the surface, went through sand and some silt (loam) but did not reach gravel. A test pit on the ridge behind the site located no cultural material below the surface.

PART I. DESCRIPTIVE ARCHEOLOGY

VILLAGE AND SETTLEMENT PATTERN

THE SETTLEMENT PLAN

The settlement plans of the McNary, Ice Harbor, Lower Monumental, Little Goose, and Lower Granite Reservoirs (the latter four are Snake River Reservoirs in Washington) have been sufficiently revealed by survey work. It would not be wise to study intensively the collections made from them, as such work could only be done satisfactorily after excavations, but the few sites that will be found by the excavating parties will not alter the settlement picture, as it is illustrated on the maps turned in by the survey teams. It must be remembered, of course, that the surveys followed the river. No work was attempted out of the valleys.

Within the river valleys, which were often of respectable width, the Indians chose to place their permanent sites, and, as far as we know now, most of their burials, close to the water's edge. We know from ethnological and historical accounts that the people depended primarily upon the river for their food but that they hunted and dug camas and gathered other vegetal products inland at various seasons. These nonaquatic activities appear rarely to have resulted in sufficient artificial alteration of the landscape to produce what could be called archeological village sites.

Along the river the situation differed. There the places generally chosen for habitation were the higher banks or lateral elevated sections of the floodplain. A certain development of the natural levees (map 3) furnished a well-drained little ridge above the water. The higher islands, which are often, structurally speaking, cut off and enlarged sections of higher banks with their natural levee fragments, were often utilized. Sites fringe the banks of the Columbia, along many stretches of the river, like beads on a double string. Island sites between them form less evenly spaced connections.

Confluences were not invariably chosen as places for settlement in spite of the number of factors that would appear to make those locations desirable. Generally, the sites near confluences were on the upriver side and back far enough to be out of danger of the usual floods.

As one ascends the Snake, sites become fewer and the intervals between them greater, this feature was noted also by Gass of the Lewis and Clark expedition (Gass, 1904, p. 155). The basis for this rests partly on the smaller fish runs and the poorer quality of the anadromous fish that do reach the higher parts of the rivers. Too, native fish were fewer and hunting rather certainly better and gathering possibly better in the higher and less arid sections. Thus, the people were somewhat less dependent upon the river. No doubt this cultural influence will show archeologically from several points of view. In line with this extensive utilization of fish goes a logical localization of settled places near good fishing grounds. Each eddy, shoal, or rapids should have its site, and actually there is 100-percent correlation between the two. This is the prime factor of settlement and utilization in the Columbia drainage.

THE VILLAGE PLAN

Although only two sites have been explored sufficiently to enable one to discuss the village plan, such evidence as is available is presented. The maps of the sites should be consulted in connection with the remarks below.

45-BN-53

This site is comparable in appearance and situation to site 18 of Strong et al. (1930, p. 32, fig. 3). It lies along the natural levee immediately above the water (pl. 1, *a* and *b*; map 2). Behind this flat rises a high ridge of dunes. Still farther inland is another cutoff and partly dry channel. Thus the situation is closely comparable to that of 45-BN-3 but on a much larger scale.

There is a rather even scattering of the 183 large-, medium-, and small-sized pits along the natural levee for almost one-quarter of a mile. There are two very large pits, one roughly near each end of the site. They are not crowded in among the other smaller pits and might possibly have been communal structures. Houses are often grouped in pairs and the larger often have a smaller pit closely adjacent on north or west. These small pits may have fulfilled the function of storage houses although it is more likely that they were subsidiary dwellings (menstrual or puberty houses, huts for elderly relatives, etc.). Further remarks will be found regarding this problem under the section on the structures of 45–BN–53. Excavation has shown that the small pits were used as dwelling pits. Other than this nothing can be said as to the village plan although there are vague groupings visible on map 2—which are probably fortuitous. The suggestion should be made that the large number of pits here may well be a result of the relatively easy digging in sandy soil.

No burials were located. This may be due to the fact that midden deposits (other than in the house pits) were scanty and that burials, once there, were washed away as the midden was removed, or it may indicate a wholly different method of disposal of the dead.

The scanty, thin midden that was found along the edge of the slope to the beach has been mentioned. Its thickening of strata riverward has been interpreted as meaning that the main dump was long since washed away or that the debris was thrown over the edge of a river bank slope similar to that now in existence. In any event there remains almost no midden worthy of name. The over-the-bank midden dump also was present at 45–BN–3.

45–BN–3

This site lay on a rather weakly developed natural levee near the foot of Berrian's Island (see map 3; map 9, *a* and *b*; pl. 2). Behind this site, along the center of the island, runs a higher ridge. This is probably an older and better developed natural levee. On the other side is a now partly filled old channel that separates the island from the mainland. Between the site and the higher ridge a slightly lower area had apparently drawn a heavy current during the 1948 flood. A road there had loosened the soil and the floodwaters excavated a large pit in the richest part of the cemetery, thus effectively obscuring a large part of the archeological record.

Apparently the dwelling sites were along the very crest of the first levee. Below this there is, at present, a low flat that breaches the levee and then drops off down a shingle beach to the water. Behind the probable line of dwelling sites, presumably very shallow recent mat lodge pits, was the area of greatest midden deposit and along the landward edge of the midden was the greatest burial concentration. There had been some refuse dumped over the edge of the levee and down the river bank where the midden would have been carried away by the water. This is an efficient method of garbage disposal, which was also used at 45–BN–53, but it is not one that finds favor with archeologists.

As can be seen from the few foregoing remarks, there is much to be done on the problem discussed. It is anticipated that the combined studies of early records and River Basin Surveys' site surveys, together with future excavations, will go far in the next few seasons toward building up a comprehensive statement as to the utilization patterns along the Columbia and Snake Rivers. It is especially important to map several other large pithouse sites and test the conclusion that there was no village plan.

THE STRUCTURES

In spite of the fact that wood was at a premium, the architecture of the Indians along the Columbia River, including those in the McNary Reservoir, depended upon the use of that material. Much of their supply was carefully hoarded drift, as can be seen from numerous references in Lewis and Clark to house timbers carefully racked and raised above the ground. Probably the method of racking that the explorers saw is that shown for The Dalles by Curtis (1907–30, vol. 8, pl. opp. p. 174). Some of the timber, usually of poor quality, was local and some was traded in (Gass, 1904, p. 155). Notwithstanding, wood was the only extensively used structural building material. Mathouses, drying racks, sweathouses, ramadas or sunshades and various quickly built forms of shelter or windbreaks, and the semisubterranean house, were all present. As a matter of fact, a number of simple and at least two well-developed structural forms were used here, as well as throughout most of the Plateau. Not properly structures are the fish storage pits seen by Lewis and Clark (Coues, 1893, vol. 2, p. 630). Other references indicate that such pits were not uncommon. None was found at either of our sites.

45–BN–53

At this site conditions were quite the opposite of those later to be described for 45–BN–3. Midden was almost wholly lacking and no burials were found. Artifacts were few but the information gained from house remains, while not as extensive as might be desired, was rich and varied. In the section on the village pattern are data which should be kept in mind while the following is read.

First to be examined are the data contained in the detailed village map (map 2). The houses were drawn to scale when mapped and the depths taken. A glance at the detailed maps and profiles of the individual houses excavated will reveal a fair cross section of this record for the whole village. The following tabulations present the data taken on each unit at the site. The diameters of the houses were measured with a surveying rod by the rodman while surveying was in progress. Depths were taken later. Two men held a cord at ground level from rim to rim of the pit, and the depth to the bottom of the pit from the cord was taken by a third man with a rod. The same surveying team both mapped and determined the depth. Therefore, the element of personal error, always present in work that depends on judgment, should be constant and the results should be sufficiently valid for our purpose. Table 2 presents the data thus gathered.

TABLE 2.—*House-pit diameters and depths*

House pit	North-south diameter	East-west diameter	Depth	House pit	North-south diameter	East-west diameter	Depth
	Feet	*Feet*	*Feet*		*Feet*	*Feet*	*Feet*
1	18	22	1.9	67	14	18	0.9
2	26	28	1.9	68	25	22	1.8
3	16	--------	.3	69	24	27	1.9
4	18	23	.6	70	44	38	4.1
5	15	23	.6	71	44	38	2.7
6	21	--------	.6	72	13	15	.5
7	16	18	1.0	73	20	21	2.3
8	16	21	--------	74	15	--------	1.0
9	12	--------	.3	75	19	--------	.8
10	9	20	--------	76	14	--------	.6
11	16	18	1.0	77	15	--------	1.1
12	16	--------	.7	78	14	--------	.4
13	8	10	.5	79	24	26	1.2
14	10	13	.6	80	15	16	.6
15	21	26	.5	81	19	24	1.3
16	20	21	.3	82	17	15	.7
17	16	--------	.6	83	14	10	.6
18	18	--------	1.0	84	14	--------	.5
19	16	--------	.2	85	25	23	1.0
20	26	22	1.1	86	14	--------	.6
21	13	--------	.5	87	14	--------	.5
22	28	26	1.1	88	15	--------	.2
23	16	--------	.5	89	18	15	.3
24	18	21	1.3	90	24	27	1.7
25	13	--------	1.6	91	13	17	1.0
26	20	21	.5	92	8	10	.5
27	18	--------	.3	93	18	20	1.3
28	13	--------	.7	94	15	--------	1.0
29	17	24	.6	95	14	12	.4
30	11	--------	.4	96	19	20	1.0
31	13	15	.3	97	14	--------	.6
32	21	24	.3	98	13	--------	.6
33	19	--------	.6	99	14	--------	.5
34	25	28	2.0	100	12	--------	.6
35	20	18	.8	101	14	11	.6
36	10	--------	.3	102	10	--------	.5
37	13	--------	.6	103	12	--------	.5
38	13	21	.8	104	25	--------	1.4
39	13	--------	.6	105	16	17	.7
40	23	24	.7	106	22	--------	1.1
41	23	25	2.4	107	23	24	1.9
42	23	24	1.4	108	12	--------	.5
43	24	21	--------	109	18	15	.9
44	17	21	.3	110	21	23	.6
45	20	--------	1.1	111	15	--------	.6
46	10	16	.3	112	24	25	1.6
47	14	17	.5	113	14	--------	.6
48	21	19	--------	114	17	19	.7
49	21	24	.4	115	12	--------	.5
50	20	19	.5	116	21	19	.8
51	22	24	--------	117	13	12	.4
52	31	20	.9	118	16	--------	.8
53	21	--------	--------	119	19	20	.5
54	20	--------	1.1	120	13	14	.4
55	20	21	1.6	121	20	--------	1.0
56	17	--------	.5	122	17	16	.2
57	19	22	.6	123	11	12	.6
58	15	18	.6	124	21	20	1.0
59	19	20	.5	125	18	17	.5
60	18	20	.6	126	17	19	.6
61	19	16	.4	127	26	--------	1.1
62	19	--------	.5	128	10	--------	.4
63	25	26	.5	129	15	16	.6
64	19	21	.6	130	20	--------	.7
65	18	21	.8	131	13	--------	.6
66	14	15	.5	132	12	--------	.3

TABLE 2.—*House-pit diameters and depths*—Continued

House pit	North-south diameter	East-west diameter	Depth	House pit	North-south diameter	East-west diameter	Depth
	Feet	*Feet*	*Feet*		*Feet*	*Feet*	*Feet*
133	17	23	0.4	158	32	28	2.4
134	19	16	.3	159	11	--------	.6
135	15	16	.5	160	15	14	.8
136	19	18	.4	161	14	16	.5
137	16	18	.4	162	28	21	.7
138	15	--------	.2	163	21	15	1.0
139	19	22	1.0	164	11	--------	.5
140	16	18	.5	165	22	23	1.0
141	18	21	.9	166	13	--------	.7
142	14	19	.5	167	28	26	2.7
143	15	17	.4	168	18	19	1.5
144	15	12	.4	169	14	20	.8
145	12	9	.5	170	15	14	.5
146	15	17	.7	171	13	14	.5
147	10	10	.6	172	10	11	.5
148	7	9	.5	173	24	25	1.2
149	15	17	.7	174	25	23	1.5
150	15	13	.5	175	11	14	.4
151	30	--------	2.1	176	17	17	1.1
152	9	11	.6	177	25	24	3.0
153	19	21	.9	178	16	--------	1.0
154	13	--------	.6	179	11	13	.3
155	11	--------	.6	180	13	14	.6
156	14	15	.6	181	11	--------	.6
157	11	13	.4	182 (82a)	15	12	.8

TABLE 3.—*House-pit diameters*

East-west diameter (feet)	Number of house pits
9	2
10	5
11	3
12	5
13	4
14	7
15	7
16	8
17	8
18	8
19	9
20	5
21	14
22	8
23	6
24	9
25	3
26	5
27	2
28	3
38	2

TABLE 4.—*House-pit diameters*

North-south diameter (feet)	Number of house pits
7	1
8	2
9	3
10	9
11	8
12	7
13	15
14	18
15	18
16	13
17	9
18	14
19	14
20	12
21	8
22	3
23	4
24	6
25	7
26	3
28	3
30	1
31	1
32	1
44	2

From table 2, tables 3 and 4 and the following deductions are drawn:

(1) In 70 percent of the houses, the east-west is the larger diameter and the north-south, conversely, the smaller. In the remaining 30 percent, diameters are equal or the north-south is larger.

(2) North-south measurement: the greatest number of houses range from 13 to 21 feet in this diameter with 14 and 15 feet being

preferred. There are secondary peaks of preference at 10 and 11 feet and at 25 feet. The small diameters may represent the huts of old or single people or menstrual houses, and the large ones dance-houses or those of important families. Lewis and Clark observed (Thwaites, 1904, vol. 4, p. 355) that "at all of these lodges of the Chopunish /Nez Perce/ I observe an appendage of a small lodg with one fire which seems to be the retreat of the women in a certain situation." The 45–BN–53 small houses (such as Nos. 168 and 169) might have been of this type.

(3) East-west measurement: the greatest number of houses range from 14 to 21 feet (almost identical with north-south) with 21 feet being the single most numerous "length." There is a secondary peak at 24 feet.

(4) The median diameter is 19 feet east-west, while it is 16 for north-south.

(5) The median depth is about 0.76 of a foot.

(6) Thus the median depression at 45–BN–53 is roughly 19 feet east-west by 16 feet north-south by 0.8 of a foot deep.

(7) It will be noted that all north-south diameters were taken, while there are a number of east-west lengths that the surveyors were unable to record. This fact would seem to fall in with the east-west length. The sides (north and south) would probably have been more heavily banked and it is likely that the door was always in one of the ends. This would appear to be partly the result of a digging pattern. These possibilities would explain a weaker development of the heaped earth at eastern and western extremities and a consequent difficulty in making the east-west measurement.

(8) Of the 122 pits which yielded both diameters, only about 34 (28 percent) can be called definitely oval (herein defined as having one diameter 20 percent or more longer than the other). Few, indeed, were true circles. These figures indicate that there was a strong inclination toward the regular use of a definite elongate shape. Note that pit 42 (map 6) would not be considered elongate from the surface measurements but when contoured and excavated it proved emphatically to be so. The architectural implications are not crystal clear: were the pits still more circular, one would be justified in the statement that ridgepoles or A-frames were not necessary and that generally equal side poles must have resulted in conical superstructure. As it is, one is inclined to believe that the superterrene structural frames were not conical or tipilike stacks of poles. They very possibly were somewhat similar to or perhaps were identical with the usually elongate Plateau "mathouse."

Tables 5 and 6 present the depths in relation to the diameters of the houses. Here the depths seem to average between 0.8 and 0.7

feet. The principal information, however, that appears from the tables is that there is an irregular but steady increase in depth of depression accompanying the increase in both diameters. Thus the larger houses were also more deeply excavated. This may have been a logical expectation but it is one that is demonstrable only by means of the tabulations.

Thus, on the basis of the data in tables 5 and 6, we can describe the houses: the semisubterranean houses were in general 14 or 15 feet wide by 14 to 21 feet long. The greatest diameter was usually the east-west one. Less than one-third of the houses were larger along the north-south diameter. Most dwellings were banked and actually appeared to be circular. There were always a few small houses with shallow excavations. They were often close to or were built contiguously to larger houses. At the other end of the scale were a few larger houses. They were deeper within, and there was a regular increase of depth with size.

I am fully aware that there is a possibility that the deeper depressions may indicate only that the deeper pits were abandoned more recently. However, the progression of increase of depth and size would, it seems, indicate that a theory of recency of abandonment of the deeper pits does not fulfill the requirements. A reference to tables 5 and 6 will show a number of exceptions to the progression. This previously mentioned irregularity is probably partly a function of the same recency of abandonment and partly variation from what has

TABLE 5.—*House-pit depths and diameter*

North-south diameter	Depth			Number of cases
	Average	Range	Median	
Feet	*Feet*	*Feet*	*Feet*	
7	0.5	0.5		1
8	.5	.5		2
9				
10	.45	.3-0.6	0.45	6
11	.5	.3-.6	.55	8
12	.45	.3-.6	.5	7
13	.62	.3-1.6	.6	18
14	.56	.4-.9	.5	17
15	.6	.2-1.2	.6	20
16	.73	.2-1.0	.65	12
17	.57	.2-1.1	.6	10
18	.92	.3-1.9	.9	14
19	.64	.3-1.3	.6	13
20	.99	.3-2.3	1.0	10
21	.65	.4-1.0	.6	8
22	1.05	1.0-1.1		2
23	1.7	.7-2.4	1.9	2
24	1.52	1.2-1.9	1.6	5
25	1.6	.5-3.0	1.5	7
26	1.36	1.1-1.9	1.1	3
28	1.3	.7-2.7	1.1	3
30	2.1	2.1		1
31	.8	.8		1
32	2.4	2.4		1
44	3.4	2.7-3.4		2

Table 6.—*House-pit depths and diameter*

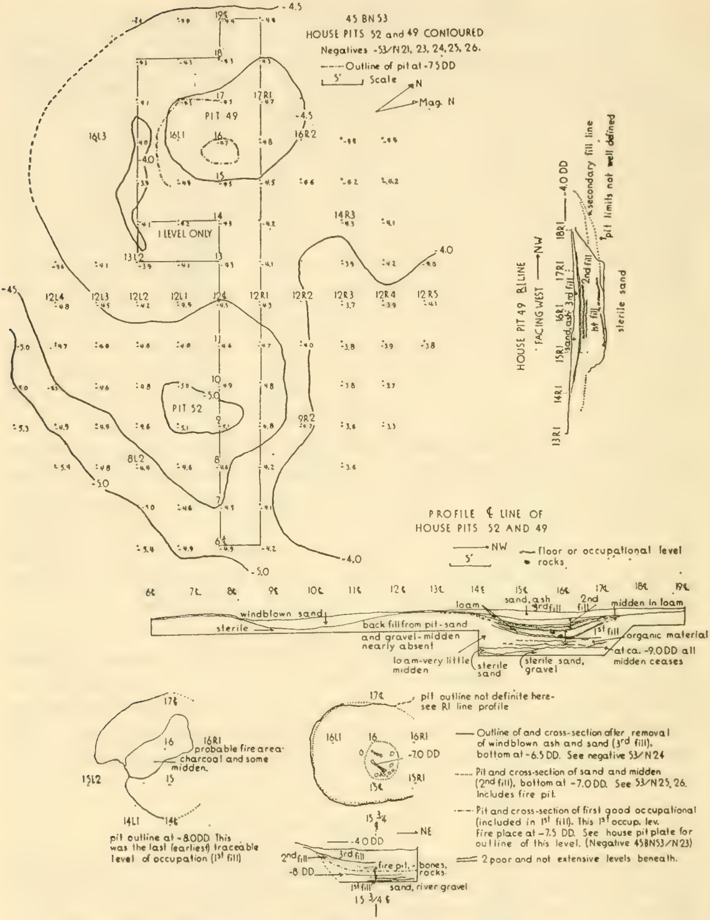
East-west diameter	Depth			Number of cases
	Average	Range	Median	
Feet	*Feet*	*Feet*	*Feet*	
9	0.5	0.5	----------	2
10	.55	.5–0.6	0.55	4
11	.56	.5– .6	.6	3
12	.52	.4– .8	.4	5
13	.5	.3– .6	.35	4
14	.4	.4– .8	.5	6
15	.6	.3–1.0	.5	8
16	.49	.2–1.0	.5	9
17	.76	.4–1.0	.6	6
18	.7	.4–1.0	.7	8
19	.77	.5–1.5	.65	6
20	.73	.5–1.0	.7	7
21	1.0	.3–2.3	.9	11
22	1.1	.5–1.9	1.0	7
23	.8	.4–1.5	.6	7
24	1.3	.3–3.0	1.3	7
25	1.3	.4–2.4	1.2	4
26	1.2	.5–2.7	1.1	5
27	1.8	1.7–1.9	----------	2
28	2.1	1.9–2.4	2.0	3
38	3.4	2.7–4.1	----------	2

been interpreted as the usual building code. With this in mind the notes were inspected for pits that appear to be either too shallow or too deep for their size. We find 31 of these: Nos. 14, 15, 16, 26, 27, 32, 40, 44, 49, 50, 52, 56, 57, 59, 60, 61, 62, 63, 64, 78, 88, 89, 110, 122, 133, 134, 136, 137, 138, 143, 162. Most appeared to be too shallow for their diameters. These may be older pits; if the site is revisited, some of them should be excavated or trenched.

The nature of the soil, the plant cover, and (as will be shown later) the fact that pits were often partly cleared out and reused prevent the basing of any definite conclusions as to age on the depth of the pits. Each of the 182 pits would have to be excavated to determine relative ages. Judging on the basis of the pits excavated, which all showed plural occupation, it would appear that only a small percentage were inhabited at any one time.

THE HOUSE PITS

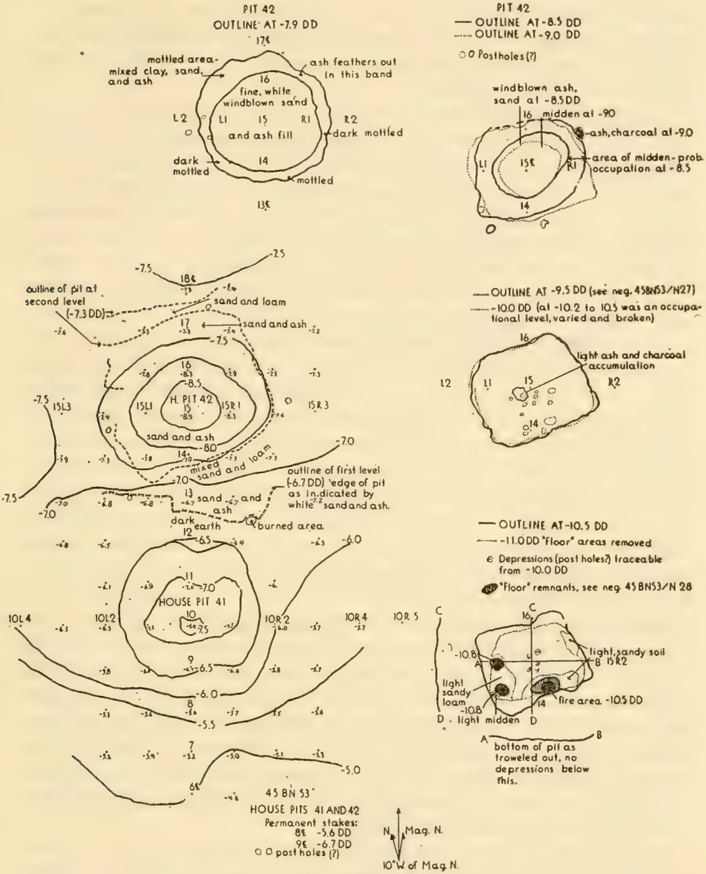
After the pits were cleared of brush and contoured, the excavation technique employed was usually that of primary cross trenching followed by such excavation of parts of the pits as expediency and the situation seemed to dictate. For example, in pit 49 (map 5; pl. 5, *a* and *b*), where the trench revealed different levels of use, one-half of the pit (the part west of the trench) was stripped. Each stripping operation removed one "occupational level" and its subsequent fill. Pit 42, on the other hand, was excavated wholly by the removal of one-half-foot levels. At the completion of each level the surface was square pointed and the data revealed were ground planned (map 6;


45 BN53
HOUSE PITS 52 and 49 CONTOURED
Negatives -53/N21, 23, 24, 25, 26.
Outline of pit at -7.5 DD
5' Scale
N
Mag. N
PIT 49
PIT 52
I LEVEL ONLY
-4.5
-4.0
-5.0
HOUSE PIT 49 R1 LINE
FACING WEST
NW
-4.0 DD
secondary fill line
pit limits not well defined
sterile sand
2nd fill
3rd fill
1st fill
sand, ash
PROFILE ℄ LINE OF HOUSE PITS 52 AND 49
floor or occupational level
rocks
windblown sand
sterile
loam
sand, ash
3rd fill
2nd fill
midden in loam
back fill from pit - sand and gravel - midden nearly absent
1st fill
organic material
at ca. -9.0 DD all midden ceases
loam - very little midden
sterile sand
sterile sand, gravel
16R1 probable fire area - charcoal and some midden.
pit outline at -8.0 DD. This was the last (earliest) traceable level of occupation (1st fill)
pit outline not definite here - see R1 line profile
-7.0 DD
Outline of and cross-section after removal of windblown ash and sand (3rd fill), bottom at -6.5 DD. See negative 53/N24
Pit and cross-section of sand and midden (2nd fill), bottom at -7.0 DD. See 53/N25, 26. Includes fire pit.
Pit and cross-section of first good occupational (included in 1st fill). This 1st occup. lev. Fire place at -7.5 DD. See house pit plate for outline of this level. (Negative 45BN53/N23)
2 poor and not extensive levels beneath.
NE
-4.0 DD
2nd fill
3rd fill
-8 DD
fire pit
bones, rocks
1st fill
sand, river gravel
15 3/4 ℄

Map 5.—House pits 52 and 49, 45–BN–3.

pl. 4, *a* and *b*). A 5-foot grid was used: the trenches were always as near magnetic north-south as the pit to be excavated would permit.

These varying techniques were supplementary in the data or facets of data that they revealed. It might be well to try 1 or 2 other methods of wringing more data from these most refractory structural remains. The information from those already excavated will be


PIT 42
OUTLINE AT -7.9 DD
mottled area-mixed clay, sand, and ash
ash feathers out in this band
fine, white windblown sand and ash fill
dark mottled
mottled
PIT 42
OUTLINE AT -8.5 DD
OUTLINE AT -9.0 DD
Postholes (?)
windblown ash, sand at -8.5DD
midden at -9.0
ash, charcoal at -9.0
area of midden-prob. occupation at -8.5
outline of pit at second level (-7.3 DD)
sand and loam
sand and ash
H. PIT 42
sand and ash
mixed sand and loam
outline of first level (-6.7 DD) edge of pit as indicated by white sand and ash.
sand and ash
dark earth
burned area
HOUSE PIT 41
OUTLINE AT -9.5 DD (see neg. 45BN53/N27)
-10.0 DD (at -10.2 to 10.5 was an occupational level, varied and broken)
light ash and charcoal accumulation
OUTLINE AT -10.5 DD
-11.0 DD 'floor' areas removed
Depressions (post holes?) traceable from -10.0 DD
'Floor' remnants, see neg. 45BN53/N 28
light, sandy soil
light sandy loam
fire area -10.5 DD
light midden
bottom of pit as troweled out, no depressions below this.
45 BN 53
HOUSE PITS 41 AND 42
Permanent stakes:
8℄ -5.6 DD
9℄ -6.7 DD
post holes (?)
N
Mag. N.
10°W of Mag. N.

MAP 6.—House pits 41 and 42, 45–BN–53.

given below in numerical order and the few conclusions that may be drawn will follow.

House pit 11 (*map 8*).—This pit was chosen for excavation for two reasons: it was centrally located and it appeared to be about an average house pit (it is really slightly larger than the median house pit as described above). In examination of this depression (see pl. 3, *b*) a roughly north-south trench was dug through the center. This trench was 5 feet (one grid square) wide and the earth was removed in one-half-foot levels. Profiles were taken along the center and along the R1 line and then the heart of the pit (four squares, two squares west from 9 c/L and 11 c/L) was removed to outline the midden, probably a floor level, that was found.

Both profiles demonstrate two phases of use of the pit. From the surface down there shows: (1) A lens of windblown sand and fine dust (largely volcanic ash) 0.5 foot at its deepest. (2) Some 2 feet of very light midden, in sand (along the centerline profile); this is proably general sweepings and refuse thrown into an already abandoned house pit from an adjacent occupied house, mingled with blown sand. (3) The saucer-shaped outline of the pit on the R1 line profile and a half-foot-thick organic layer on the center line certainly mark the floor level of the last occupation of pit 11. (4) There is again a fill of light midden in sand, probably marking a period of nonuse of the pit when man and the elements contributed to its filling. (5) Below this is about 1 foot of mingled light occupational debris in sand. Most outstanding in the area of light midden, and really capping it, were a series of fragments of partly carbonized and partly decayed matting (field specimen 45–BN–53/34; see p. 116, pl. 25, *b*). Below this was an ashy concentration, rather discontinuous to be called a lens although it is drawn as that. It contained bits of the same matting, possibly fragments of finer matting and general fireplace refuse. (6) A few inches below this, and slightly off center, was a further remnant of combustion.

While this sequence was clear enough both on profile and in horizontal excavation there was, south of 8.5 c/L and north of 11 c/L, no evidence of the house pit's outline on the closely scrutinized profile. This, too, was the very center of the pit. The explanation that occurs to me is that there must have been, along the sides of the pits, large or small sections of cave-in or slump that obscured or destroyed the outline. It should be noted that a fragment of house pit 8 appears on the R1 line profile. Here again is noted the peculiar saucer-shaped outline of the filled and slumped pits.

House pit 41 (*map 6*).—This pit was not excavated although it was cleared, contoured, and staked for excavation; the shape is rather more circular than most. It was separated from pit 42 (map 6) by a thick hummock or ridge. This gave the impression that the two had been contiguous or nearly so and were probably contemporary in use. The result, then, would have been a greater quantity of banking earth (the assumption is certainly safe that these houses were, while not heavily earth covered, at least earth banked) between the two and the accumulation of earth noted. This shows on the contour map only as indentations of the contours of pit 41 and the deeper pit 42. It was not high enough to merit a contour line of its own.

House pits 42 and 41.—These pits were staked out with the intention of excavating them as a unit. When it became apparent that this would be impossible because of the lack of time, pit 42 was selected for completion. Because of previous experience we were anxious to attempt the horizontal sectioning of a pit. This small one seemed ideal and it was therefore excavated by the removal of 0.5-foot levels. A record was made at the completion of each level. This resulted in the series of plans seen on map 6. Eight levels, two of them 0.6 foot in depth, sufficed to remove the pit. A test hole was dug from the last level to insure against leaving further occupation material below.

The following description should be read with reference to the map and plate 4. It will be noted that the original pit was elongated east and west; the underlying cause of this is visible in the plans of the lower levels where the pit shape is seen as an elongate, irregular rectangle with rounded corners.

For the first two levels there was little visible except the windblown last fill of the pit; around this at −7.3 datum depth (DD) appeared the north edges of the first up-slanting concentric shell of midden. This shows well in the plan of the pit outline at −7.9. Here there is windblown material in the center and a mottled mixture of soils and midden encircling it. This situation continues through the next level where the midden band widens. At the −9.0 DD all of the last aeolian fill is removed and the pit is rectangular and wholly filled with sand with the usual light midden content. Thereafter the pit outlines at succeeding levels agree until the last is reached. Here the bottom level is somewhat smaller. This is, of course, a result of the saucer shaping of the bottom of the house pit itself. Taken altogether the sides of this pit held closely to the near vertical. It should be noted that the areas of light sandy soil on the south, east, and west of the bottom levels would have shown on a profile and obscured this near-perpendicular nature of the upper parts of the house-pit sides.

Although the pit was filled with light midden and may have been used for a short period at −9.0 DD, the main occupational layer was definitely, though of varied intensity, from −10.0 to about −11.0 DD (pl. 4, *b*). Here fire and occupational debris appeared in some quantity; charred rushes, grass, animal bones, and many small rodent skeletons were present (these latter probably died in their burrows or fell into the pit and were not able to get out). Below −10.5 DD were sections where the sandy soil in which the pit was sunk had transgressed into the pit. One of these shows on the north side of plate 4, *b*. As previously mentioned, I have interpreted these as slumps or falls from the pit wall and pointed out that such failure of the soil would obscure a profile. It must be remembered that the very slightly clayey or loamy river-sand soil of this area will not retain a vertical face for more than a short period of time. Irregularity of pit outline, the saucer-shaped pit outlines, lack of definite floor levels, etc., are to be expected in view of this.

Firepits were not present but an ashy, burned area lay in the middle of the house at level −9.5 DD and near the south edge at −10.5 DD. At −9.0 DD just outside the pit outline was a small charcoal and ashy accumulation. This may have been dumped there.

In spite of the uncertainty which stemmed from the lack of decisiveness in soil differences we were able to trowel out three small areas that appeared to be rather well packed and might have been floor remnants. It is as likely, however, that they were organic, clayey areas slightly hardened by the heat of fires. They were heavily carbonized and, like most areas of carbonization, were thin and irregular. It is not probable that they represented parts of a burned superstructure but rather that they were the remains of burned floor covering, grass, loose rushes or twigs, etc.

At various levels, but principally through the last three, were noted depressions which bore vague resemblances to postholes. Some of these were traceable, at least in part, and in the center of the pit, from the −10.0 DD to the −11.0 DD levels. I am here using the word "traceable" loosely. They were often not in exactly the same places but relative positions were closely similar. Depressions of the same nature, other than in the center of the pit, usually disappeared within a level. No other evidences of a superstructure were seen—if these may be interpreted as and considered to be even the most unsatisfactory of postholes. This lack of structural remains of any type (the excavation extended far enough beyond the pit outline to have revealed any side stakes or rafter ends) and the several "postholes" in the center support the suggestion of a movable or temporary roofing depending upon one or two central supports. These might have been removed and reset in different places leaving a packed "cast" or depression for each move. Perhaps future work in the reservoir will shed more light on this conjecture but reference may be made here to a Lewis and Clark observation (Coues, 1893, pp. 630–633). Here the explorers describe stacks of house timbers which were removed from their structural positions and racked to insure better preservation. If this custom were as widespread as it seems to have been, it would explain the lack of timbering in the house pits excavated. It is rather doubtful that the Plateau Indians made a sudden shift from a permanently roofed earth lodge to the more mobile mat lodge. There was no evidence of an entrance way. The number of small animal bones on the bottom floor have led to the conjecture that there was a relatively straight-sided pit without a sloping entrance.

House pit 49 (*map 5*).—This pit was, again, the northern member of a pair of pits. Here a long trench was dug through the center of pit 49 and its twin, pit 52. Half of 49, the western half as with pit 11, was then excavated. This was not done by levels, as with pit 11, but by stripping off the various saucer-shaped lenses of soil that filled the pit down to and including the organic lines that separated them. The centerline profile shows well the several gently curved lines of midden or organic-stained sand that must have been occupational levels. First to be removed was the windblown sand and ash (third fill, see pl. 5, *a*). Next the second fill, which included at least one poorly developed and discontinuous occupational level, was stripped off. The central part of the house, with the fire area and debris (first fill), was partly revealed by this stripping and is shown in plate 5, *b*. The irregular basin shape of the pit was noticeable at both of the above cuts.

This last cut mentioned dipped into the upper half of the first fill where was found the heaviest concentration of midden (pl. 5, *b*). This concentration was replete with a number of animal bones, the larger ones bison, large stones, and extensive organic remains. When the occupational level and the central, probably fireplace area, was cleaned, the decided basin shape of the pit was as shown in plate 6, *a*. Below this level were at least two very thin and only partly traceable lines of organic staining in the sand. They represent rather short, but the earliest occupations.

On the ground plan of pits 49 and 52 (map 5) may be seen the long centerline profile of both, an R1 profile of pit 49 and a short east-west profile between 15 and 16 centerline. The latter was constructed in the laboratory for purposes of illustration. The pit outlines appear to have been an oval slightly elongated east and west. The last one removed at −8.0 DD was altogether too tenuous of outline to allow deductions.

This pit illustrates, and is at least largely responsible for an impression gained in the field and still partly retained: that these house pits were usually made larger at first and decreased in size through successive occupations. It will be noted that the bottom midden lines or levels of occupational debris are flatter and that successive levels may therefore diminish in size. Possibly the pit partly filled with windblown material and washed sand after it was abandoned and the sides also fell in. When the pit was again selected for habitation it was only partly cleared; the sides were not cut back and made vertical nor was the sand and midden entirely removed from the original pit. It may well be that this old habitation debris was covered with clean sand. At any rate the pits that had several distinct periods of occupation seem to have been filled by use and to have decreased in size through use. This is well shown by the northwest end of the R1 profile of pit 49. Plate 6, *b*, shows the south end of the profile and a stake column.

House pit 52 (*map 5*).—This pit was trenched while excavation of pit 49 was in progress. This house pit may have been one of the more recent ones dug. There are two reasons for this statement: (1) There was only one very thin level of occupation and it lay directly below the blanket of windblown sand. The period of occupation must have been short. (2) The lens of windblown sand is thicker than we generally noted. This suggests that a relatively deep hole was completely abandoned to the elements.

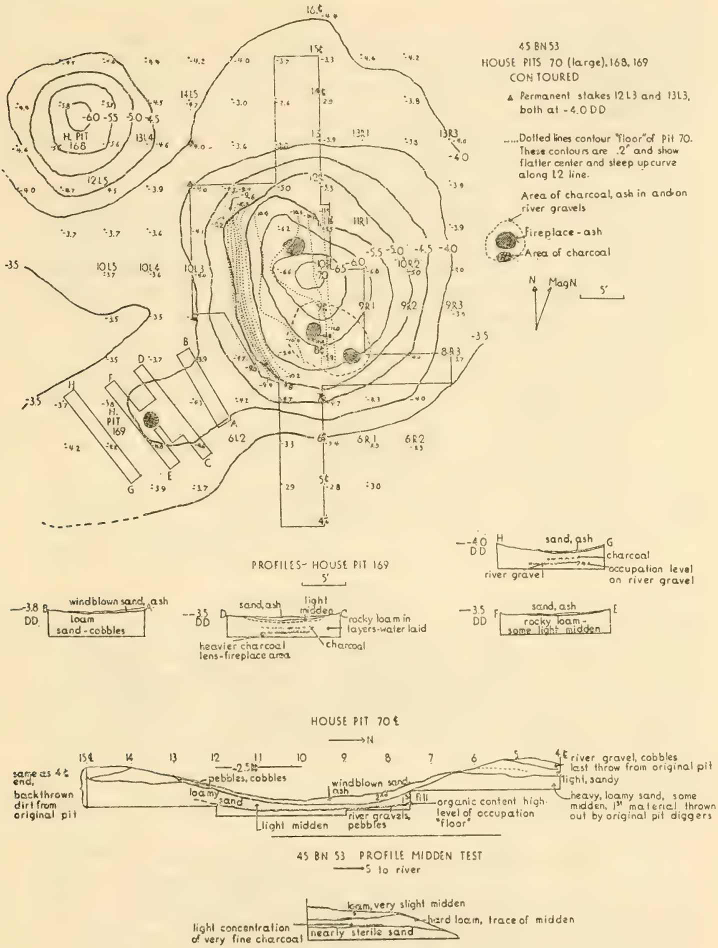
House pit 70 (*map 7, pl. 7, a*).—This pit was, again, probably a recent but prehistoric house pit. It was the largest and deepest pit on the upriver part of the site. The depth suggested recency and so the pit was trenched down into the underlying gravelly structure of the river bank. One floor and occupational level was found resting almost on the river gravels; there was a thin layer of sand covering this gravel. Excavation proceeded through the western half of the pit. Later, part of the eastern fill was removed and a trench was driven to the eastern extremity. No evidence of an entrance way was noted. Two areas of ash and charcoal were present. One of these was off center to the north and the other lay to the south and east of the pit center.

The usual saucer-shaped pit outline prevailed. This can be seen on both the profile and the ground plan where the dotted contour lines show the form of the western half of the pit. This pit probably extended 2½ feet below the original ground level and 6 feet below the banked rims when in use. It is unfortunate that neither the profile nor excavation of this large pit showed its sides. Except in rare cases and in small sections (pl. 6, *b*) as in pit 42 noted above, sandy soil such as that in which it and the others were excavated simply will not retain the probably nearly vertical or sharply sloping sides of such features.

The profile does show the aboriginal sequence and method of excavation. The back-thrown earth from the pit repeats in reverse the local soil profile. There is, on top of the pit rim, a capping of gravel and cobbles from the bottom of the pit, then a layer of light sandy soil which came from just above this gravel layer, followed by a layer of heavy loamy sand which contains some midden. There was, of course, topsoil and near topsoil—the first removed from the pit.

No evidence of fallen roofing or of superstructure was found in this pit.

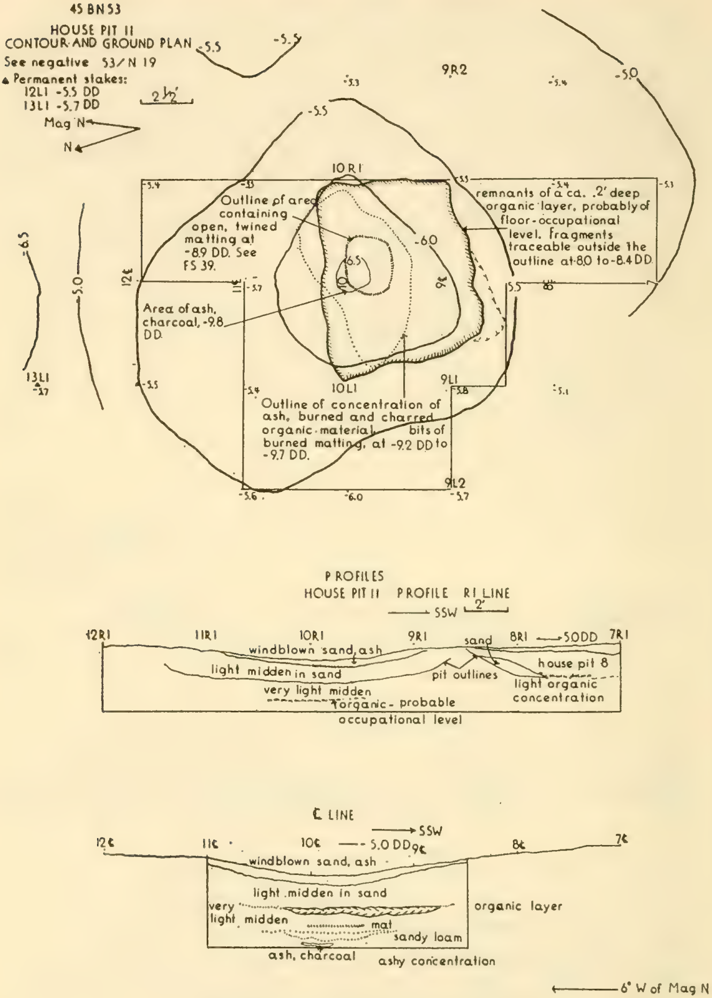
House pit 168 (*map 7*).—This is a small circular depression adjacent to the northwest rim of 70. It was cleared and staked but not


45 BN 53
HOUSE PITS 70 (large), 168, 169 CONTOURED
▲ Permanent stakes 12L3 and 13L3, both at -4.0 DD
.....Dotted lines contour "floor" of Pit 70. These contours are .2' and show flatter center and steep upcurve along L2 line.
Area of charcoal, ash in and on river gravels
Fireplace - ash
Area of charcoal
N
MagN.
5'
H. PIT 168
H. PIT 169
PROFILES- HOUSE PIT 169
windblown sand, ash
loam
sand - cobbles
sand, ash
light midden
rocky loam in layers-water laid
heavier charcoal lens-fireplace area
charcoal
sand, ash
charcoal
occupation level on river gravel
river gravel
rocky loam - some light midden
HOUSE PIT 70 ℄
→N
same as 4℄ end, backthrown dirt from original pit
pebbles, cobbles
loamy sand
windblown sand
ash
fill
light midden
river gravels, pebbles
organic content high- level of occupation "floor"
river gravel, cobbles last throw from original pit
light, sandy
heavy, loamy sand, some midden, 1st material thrown out by original pit diggers
45 BN 53 PROFILE MIDDEN TEST
→S to river
loam, very slight midden
hard loam, trace of midden
nearly sterile sand
light concentration of very fine charcoal

Map 7.—House pits 70, 168, 169, and Midden test, 45–BN–53.

excavated. The earth rim separating pits 168 and 70 was distinct and sharp.

House pit 169 (*map 7*).—This was not separated from pit 70 as sharply. Consequently it was hastily trenched in the closing days of the dig. These trenches are shown in profile on the ground plan


45 BN 53
HOUSE PIT 11
CONTOUR AND GROUND PLAN
See negative 53/N 19
▲ Permanent stakes:
12L1 -5.5 DD
13L1 -5.7 DD
2½'
Mag N
N
-5.5
-5.5
-5.3
9R2
-5.4
-5.0
-5.5
10R1
-5.4
-5.3
-5.5
-5.4
-5.3
Outline of area containing open, twined matting at -8.9 DD. See FS 39.
remnants of a ca. .2' deep organic layer, probably of floor-occupational level. Fragments traceable outside the outline at 8.0 to 8.4 DD.
-6.0
-6.5
-5.0
12¢
11¢
-5.7
6.5
10
9¢
5.5
8¢
Area of ash, charcoal, -9.8 DD.
13L1
-5.7
-5.5
-5.4
10L1
9L1
5.8
-5.1
Outline of concentration of ash, burned and charred organic material, bits of burned matting, at -9.2 DD to -9.7 DD.
9L2
-5.6
-6.0
-5.7
PROFILES
HOUSE PIT 11 PROFILE R1 LINE
SSW
2'
12R1
11R1
10R1
9R1
sand
8R1
5.0 DD
7R1
windblown sand, ash
house pit 8
light midden in sand
pit outlines
light organic concentration
very light midden
organic - probable occupational level
¢ LINE
SSW
12¢
11¢
10¢
5.0 DD
9¢
8¢
7¢
windblown sand, ash
light midden in sand
very light midden
organic layer
mat
sandy loam
ash, charcoal
ashy concentration
6° W of Mag N

MAP 8.—House pit 11, 45–BN–53.

of pit 70. They are, in every respect, miniatures of profiles from the larger pits. It will be noted that a central fireplace is also present. Until this excavation the theories persisted that these small pits, which were so often adjacent to larger ones, were storage facilities or were entrance ways for the larger ones. There can be no doubt, now, that pit 169 and presumably the others were neither. Pit 169 had the remnants of possibly two levels of apparently short occupation. The lower one of these rested on or was just above river gravels. The fire remains were associated with this lower level. It will be noted that river gravels were a little over a foot higher at this location than in the center of pit 70. This is not particularly remarkable, as pit 169 is closer to the river and farther up on the natural levee.

My present interpretation of these smaller houses, which are often found adjacent to the larger ones, is that they are menstrual or puberty huts. It is, of course, also possible that they were the dwellings of elderly or poor relatives of the dwellers in the larger house pits.

House pit 71.—This pit (not illustrated) was cleared, staked, and contoured, but not excavated. The east-west elongation of this pit was particularly noticeable.

House pit 72.—This pit, in its relation to pit 71, reminds one of pits 169 and 70. The same situation probably did obtain. It appeared in the field, and the map seems to justify the impression that small house pits, when adjacent to large ones, were most often on the west or north sides of the latter.

SUMMARY

A few general statements may now be made and some inferences drawn:

(1) The house-pit floors were not level but sloped up at the edges in the shape of a shallow saucer. The sides of the pits themselves often were not fully traceable. Saucer-shaped pits have been recorded by Daugherty (1948) in central Washington and by Cressman (1948, pp. 85–86) in the Klamath area. The pits themselves, in horizontal section, had an elongate rectangular shape, with rounded corners.

(2) There was generally more than one occupational level; exceptions were house pits 52 and 70.

(3) The pits themselves were not cleaned out by each succeeding occupying unit. As a matter of fact, it is possible that sand was carried in to cover the older "floor." Thus the pit often decreased in size (both in depth and diameter) through use and the slump of the sidewalls. It thus gradually removed itself from existence as far as the living village was concerned.

(4) Floors, or better, levels of heavier midden and burned material, were tenuous and difficult to follow.

(5) Usually the fireplaces or fire areas were in the center or near the center of the pits (pit 70 is a partial exception).

(6) Pairs of pits, or sometimes three pits, often small, that may have had use as subsidiary dwellings were found near larger house pits.

(7) A central location of possible structural debris or floor covering or of structural evidence (postholes) was an almost invariable rule. The latter, however, was noted at only one pit (42).

(8) Entrances were not found. It is possible that they were in the roof, but one would expect, in that event, a fairly heavy superstructure and that there would be some archeological remnants of them. None was found. It is possible that the pits were entered by a short ladder down the side (Teit, 1928, p. 144; 1930, p. 331). If so, this might explain the lack of any entrance indication at pit 42 unless the slumped areas on the south, east, or west sides had been the location of entrance ways. The number of small rodent skeletons in this pit leads one to conjecture that they were trapped therein. One would postulate a fairly straight-sided pit if this were true and it appears from the plans that pit 42 did have rather more vertical sides than most of the others.

(9) The absence of remains of posts, rafters, girders, or of any other certain structural evidence has led to the suggestion of flimsy and probably temporary superstructures. The complete removal of all timbers each time a pit was temporarily abandoned may be the explanation of this lack of evidence. The fact that several occupations were usual for most pits would fit well into this pattern.

(10) No trade goods were found in any pits.

(11) Evidence of sociological divisions in the site plat are probably lacking. The larger houses are not grouped, as mentioned, and it may be that they had some relation to social or recreational activities.

There are several of the above that suggest the possibility that we might be dealing here with the remains of a definite early type or prototype of the Plateau mathouse. It may be significant that Ray (1942, p. 177) does not list earth lodges for the Umatilla. One type of the subterranean house existed among the Walla Walla (Walula) and it would appear that the Lewis and Clark maps might well be correct and that the Walula were then in what later became Umatilla territory (Thwaites, 1904, vol. 7, map 31; Teit, 1928, p. 100). Certainly more can be said on this score when excavating parties have toiled on up the Columbia and Snake Rivers.

Judging from the data given by Ray's informants, the McNary house pits could fit into the Umatilla mathouse plan. Most of the 45–BN–53 pits were fairly shallow, although in the easily dug and well-drained soil they might have been deepened. If Umatilla maximum widths and minimum lengths are used, most of the house-pit-depression measurements can be made to fit into the Umatilla limits.

Too, the Umatilla usually alined their houses with the greater measurement in the direction of the prevailing winds; i. e., east and west. Most of the houses had only one fireplace—house pit 70 is the exception—while mathouses were usually furnished with several. A temporary mathouse well banked and with a short ladder entrance at one end might be the ethnological picture as given here.

STRUCTURES AND ARTIFACTS

So few artifacts were found in the structures, or at 45–BN–53 as a whole, that it is not possible to state surely that there is no change reflected in them either vertically within a single house or horizontally between parts of the site. Such, however, is the situation as it now appears.

The most extensive collection came from house pit 42: five choppers; several flakes, some retouched; spalls; one broken point; one small grinding slab or hopper-mortar base; one scraper; one bone bead; one broken arrow smoother; one olivella shell; one bone awl; and bits of charcoal and mussel shells. This is not a very sensitive collection and those from the other pits are less extensive.

A few statements may be made on the basis of the vertical layouts. The lowest occupational level, or at least the lower two levels, were by far the richest in artifact yield as well as in organic content. This strengthens the previous contention that the first or at least earlier occupations of a house pit were the longest or most intensive and that the later ones were little more than camping. This was true of all pits excavated. Most of the artifacts, and other refuse, came from near the fireplaces. Grinding slabs or bases for hopper mortars were associated with the hearths or the first occupational level in two of the five finds. Of the other three, two were surface and one was in the midden test.

45–BN–3

This site was reported to have had structural evidence at one time. Only a single stony area was found that might have marked the site of a structure (maps 3 and 4).

THE BURIAL COMPLEX, 45–BN–3

There was no burial complex at 45–BN–53. Therefore all skeletal material discussed below is from 45–BN–3.

This section will be wholly descriptive; only raw data appear here. Comparative material appears in part 2. Marshall T. Newman's study of the skeletal material appears as appendix 1. If, as so often happens, there is a failure to comment on the very fact for which some other student is searching, he will have but to pore through the burial information to locate or ascertain the absence of the material in which he is interested. The site map and profile should be consulted for locations, etc., in this context. Here it must again be mentioned that a number of burials were disturbed by a large pit (pl. 3, *a*) washed out in the low area behind the site by the 1948 flood. Thus burials 1 through 14 and 16 were at least in part disturbed by this agency (pl. 7, *b*). As it led to an easy discovery of the best part of the site, the complaints should not, perhaps, be too bitter.

Pertinent field data on the skeletons (in some cases corrected by Newman's work), the location of the burial by square with north and west measurements from the (SE) stake and depth from permanent datum and the artifacts by field catalog number, site/burial/number, are given below. A question mark following the artifact number indicates that the association with the burial was probable.

Burial 1 (pl. 7, *b*): 34L6, 5.4′ N., 8.4′ W., −13.1 DD. Origin: ?. Deposition: torso in ventral position, face down, semiflexed (?), head NW., badly disturbed in washout pit. Sex: M. Age: young adult. Condition: fair skeleton, fragmentary. Artifacts, 45–BN–3/B1 (?)/:

/176 (?). Bone bead with incised decoration; near pelvis (pl. 23, *a*, 28).
700 (?). Bone bead, incised, found in lab (pl. 23, *a*, 26).

Burial 2: 34L6, 9.6′ N, 8.6′ W., −13.2 DD. Origin: ?. Deposition: badly disturbed, in washout pit. Sex: M. Age: old adult. Condition: incomplete, fair. Artifacts, none.

Burial 3: 35L6, 1.4′ N., 9.0′ W., −12.4 DD. Origin: ?. Deposition: badly disturbed in washout pit. Sex: M. Age: old adult. Condition: fragmentary, fair. Artifacts:

/723. Olivella shells, 8, tips ground off; are associated with burials 1–3.

Burial 4 (pl. 7, *b*): 34L6, 4.4′ N., 0′ W., −12.4 DD. Origin: ?. Deposition: badly disturbed in washout pit. Sex: F. Age: young adult. Condition: fair, incomplete agglomeration of bones. Artifacts, original positions in the grave unknown:

/83 (a).	Antler wedge (pl. 23, *a*, 7)
83 (b).	Bead, blue glass
84.	*Dentalium* bead, fragmentary
87.	*Glycymeris* shells, 2, perforated
88.	*Haliotis* shell pendant (pl. 24, *a*, 14)
90.	Beaver tooth, fragmentary (pl. 23, 17)
91.	Pestle, tapered, diorite porphyry (pl. 20, *b*, 3)
92.	Blade, long; petrified wood (pl. 22, 2)
93.	Antler digging-stick handle, fragmentary (pl. 23, *a*, 3)
94.	Bracelet, iron (pl. 31, 3)
164.	*Glycymeris* shell beads, 7, perforated
165.	*Dentalium* shells, 3, fragmentary.
166a (?).	Copper tube bead, small
166b.	*Glycymeris* shells, fragmentary, probably strung
166c.	Large piece of mussel shell
166d.	Projectile point, fragment (petrified wood)
178.	Copper pendant
179.	Dentalia fragments, 2, one with bead inside

Burial 5 (pl. 7, *b*): 35L6, 7.0′ N., 4.5′ W., −12.6 DD. Origin: ?. Deposition: badly disturbed in washout pit. Sex: F. Age: old adult. Condition: very fragmentary, fair. Artifacts, original positions unknown:

163. Wedge, antler (pl. 23, *a*, 6)
172 (?). Blade, basal fragment, pink flint
171. Awl, bone, broken
173 (?). Copper tube bead, large
174 (?). Celt, small, chalcedony (pl. 19, *b*, 1)
175 (?). Blade, long, petrified wood (pl. 22, 1)
177 (?). Sinker, flat cobble, 2 notches (pl. 18, *a*, 30)

Burial 6: 34L6, 1.5′ N., 3.0′ W., −13.5 DD. Origin: ?. Deposition: badly disturbed in washout pit. Sex: F. Age: young adult. Condition: very fragmentary, fair. Artifacts, from surface near burial:

21 (?). *Glycymeris*, perforated

Burial 7 (pl. 8, *a* and *b*): 35L6, 0.0′ N., 3.5′ W., −13.1 DD. Origin: ?. Deposition: disturbed, probably semiflexed, on back, head NW. Sex: F. Age: old adult. Condition: incomplete, fair. Artifacts, all are shown in plate 8, *b*, and in other illustrations of the same pieces, as listed below:

29. Projectile point, triangular
30. Projectile point, triangular
31. Projectile point, triangular; original positions uncertain
/32. Hair remover or flesher, toothed (pl. 23, *a*, 21)
33. Projectile point, small, stemmed and notched
186. Blade or point, large, oval (pl. 22, 3)
225. 1 *Dentalium*, 1 *Olivella*, 2 *Glycymeris* shells
226. 1 *Olivella*, 2 *Glycymeris* shells
227. Spatulate bone, broken
228. Copper tube bead
229. *Glycymeris* shells, 6
230. 3 *Glycymeris* shells, 1 *Olivella*
231. 10 *Glycymeris* shells, 2 *Olivella* in straight line, probably strung; also 2 mussel shells
232. Pestle, tapered, broken in two parts (see No. 242)
233. 15 *Glycymeris* shells.
234. Copper tube bead, tapered
235, 267. Celt, small, broken (pl. 19, *b*, 6)
236a. 2 projectile points, both triangular with straight bases
236b. (pl. 22, 9)
237. Copper tube bead
242. Pestle, broken, part of catalog No. 232
244. Shell pendant, small, *Haliotis kamchatkana* (?), (pl. 24, *a*, 2, 13)
245. Projectile point
246. One tool, spatulate end for weaving or sewing rushes (pl. 23, *a*, 4)
247. Point or drill, expanding base, red flint (pl. 22, 35)
248. Projectile point, triangular, large, petrified wood
249. Broken blade, petrified wood
250. Antler, broken, probably end of digging-stick handle, or wedge
251. Black earth, found in bits in burial
252. Broken blade, petrified wood
253. Point, large triangular, petrified wood (pl. 22, 8)
260. Shell pendant, *Haliotis*, drilled (pl. 24, *a*, 17)
261. 55 *Glycymeris*, *Olivella* shells (pl. 24, *a*, 9)

Complete validity of this association could not be checked, as the whole area was disturbed. There was a fair amount of gravel among the bones and artifacts which probably resulted from the washing action and settling at the bottom of the pit.

Burial 8: 35L6, 6.5′ N., 0.7′ W., −14.7 DD. Origin: ?. Deposition: badly disturbed. Sex: ?. Age: child, 9–10 years. Condition: fair, fragmentary. Artifacts (original positions unknown):

238. Worked tooth (deer incisor)
239. Arrowshaft smoother } Pair of large sandstone, single-grooved
240. Arrowshaft smoother } (see No. 294)
241. Antler wedge, badly decayed (pl. 23, *a*, 9)
255. Strap iron object, small (pl. 31, 8)
256. *Dentalium* shell, fragmentary
257. Bone pin, long, grooved (pl. 23 *a*, 23)
258. Antler wedge ?, tip (pl. 23 *a*, 8)
259. Antler piece, flat with two holes } (pl. 23, *a*, 16)
266. Antler piece, joins with 259 }
294. Arrowshaft smoother } pair (pl. 19, *a*, 1 and 2)
239, 240. Arrowshaft smoother }

Burial 9: 35L5, 1.0′ N., 0.0′ W., −13.0 DD. Origin: ?. Deposition: badly disturbed. Sex: F. Age: adult. Condition: a fragmentary grouping of human bones, fair. Artifacts?

243. Bone whistle or flageolet, ulna of Golden Eagle (pl. 23, *a*, 13)
262. Trade button, shanked, drilled, impressed decoration (pl. 33, *b*, 12)
263. Trade button, crushed and broken (pl. 32, *b*, 13)

These were in the burial area: association and original positions are questionable. There were a large number of artifacts in this grave area which we were unable to assign to any burial.

Burial 10: 35L6, 3.6′ N., 0.0′ W., −13.6 DD. Origin: ?. Deposition: disturbed and virtually destroyed. Sex: M. Age: old adult. Condition: poor, ankylosed foot bones, absorbed (or amputated?) (see Elliot, T. C., 1909, vol. 10; Peter Skene Ogden (1826) Journals VXI, No. 2, p. 214) femur only. Artifacts, none. Apparently a pathologic skeleton, it is unfortunate that it was not fully recovered (see Appendix 1, pp. 212–213).

Burial 11: 35L6, 4.0′ N., 4.5′ W., −14.0 DD. Origin: ?. Deposition: disturbed. Sex: M. Age: subadult, 18–20 years. Condition: fragmentary, fair. Artifacts:

270. Arrowshaft smoother, probably associated as it pairs with No. 271 (pl. 19, *a*, 5)
271. Arrowshaft smoother, by skull (pl. 19, *a*, 6)
300. *Dentalium* shell, broken, position unknown.

Burials 12, 13, 14 (pl. 9, *a*): 36L5, 1.0′ N., 9.0′ W., −14.7 DD. Origin: ?. Deposition: badly disturbed. Sex: all F. Age: adults. Condition: fair, all fragmentary, 3 skulls found together, plus miscellaneous bones. Artifacts, large number in immediate area, original positions uncertain:

B12/301 (?). Carved effigy, large (pl. 20, *a*, 22)
302 (?). Graver or drill (pl. 22, 38)
303 (?). Blade, broken, petrified wood
304 (?). Blue trade bead
305 (?). Pendant of mussel or *Haliotis*, small (pl. 24, *a*, 15)
306 (?). 4 blue trade beads

B12–14/254. Mallet handle (see No. 308; No. 254 was given to whole artifact and then assigned to B12–14) (pl. 21, *a*)
307. Stone mallet, unbroken, andesite (pl. 21, *a*, 1)
308. Mallet base, belongs to handle No. 254
309. Riveted copper pendant (pl. 29, *b*, 12) (bucket ear?)
310. Eye for helve of small HBC ax, iron (pl. 31, 11)
311. Projectile point, triangular, large, petrified wood (pl. 22, 6)
366. Copper tube bead, small
367. Soapstone pipe bowl fragment (pl. 19, *b*, 12)
368. Broken blade, petrified wood
369. Point or blade, side-notched, large, broken, petrified wood (pl. 22, 20)
370. Broken blade, petrified wood (pl. 21, *b*, 18)
371. Copper tube bead with large string inside, was lying to left of skull 14
373. Blue trade bead
374. Blade, broken, petrified wood
375. Blade, broken, petrified wood
376 (?). Worked bone, calcined
377 (?). Tinkler, conical, iron
378 (?). Copper tube bead, small
379 (?). Pendant, copper, small, square
380 (?). Copper tube bead, small
381 (?). Stone, burned, smooth.

Burial 15: 30L3, 3.5′ N., 4.5′ W., −8.3 DD. Origin: immediately below present surface. Deposition: completely decayed and disturbed. Sex: ?. Age: adult. Condition: poor, no bones saved. Artifacts (position in relation to body unknown):

345 (?). Thimble, small, drilled at top for suspension (pl. 29, *b*, 1)
346 (?). Pendant, copper, long, decorated at edges (pl. 29, *b*, 3)
347 (?). *Dentalium* shell, small fragment

Burial 16: Origin: ?. Deposition: ?, disturbed. Sex: F. Age: child, ca. 12 years. Condition: good, skull only, found on surface of washout pit. Artifacts, none.

Burial 17 (pl. 9, *b*): 28L5, 9.0′ N, 0.0′W, −10.7 DD. Origin: burial was 2′ from surface, no grave traceable, lines of excavation leach away quickly in sand. Deposition: on left side, hands in front of face, full flexure, head NW. × W. Sex: M. Age: middle aged. Condition: poor, complete. Artifacts:

443. 10 dentalia, none decorated, scattered along body

Burial 18: 30L5, 8.0; N., 8.5′ W., −10.0 DD. Origin: burial was 1.0′ from surface, cist (feature 5) originated 0.4′ above burial, all in compacted loamy sand of the light midden layer. Deposition: on back and right side, legs to right, left hand on chest, fully flexed, head to W. Sex: F. Age: middle aged adult. Condition: poor, decayed, and fragmentary. Artifacts:

555. Beads, *Juniperus occidentalis* seeds, 75 cm. string, near left hand on chest (pls. 24, *a*, 18, and 24, *b*, 7)
689. Mussel shells, 4, fragmentary
701. Scraper, flake, retouched, black chalcedony (found in laboratory)
702. Beads, juniper seeds, on rt. radius with matting (?)
704. Mussel shell, separated in laboratory.

Burial 19: 30L5, 4.0′ N., 7.0′ W., −9.7 DD. Origin: burial was about 0.9′ from surface inclusive in light midden sandy loam layer. Deposition: on back, extended, head W. Sex: ?. Age: infant. Condition: poor, fragmentary. Artifacts:

703. Comb, bone, ends of 4 teeth remain, found in laboratory

Burial 20 (fig. 1): 30L3, 8.0′ N., 7.0′W., −9.8 DD. Origin: burial was about 1.6′ from surface, oval pit was not visible until below burial, inclusive in upper or first loamy sand layer. Deposition: on left side, right arm behind, left at side, full flexure, head to SW. Sex: F?. Age: middle aged. Condition: fair, complete but fragmentary. Artifacts:

487. Bird-bone whistle or flute, across right femur
488. Wood artifact, sample from in front of chest; burial was wrapped in mat (?) (this was not saved)

Burial 21: 28L5, 2.0′ N., 2.0′ W., −11.9 DD. Origin: Burial was 2.5′ from surface, intrusive into second layer of sparse midden in loam from the first layer of sandy loam, lines of oval pit traceable 0.8′ above burial. Deposition: on back, face W., legs on stomach, left hand beneath knees, right hand at side, full flexure, head S. Sex: M. Age: 13–17 years. Condition: poor, fragmentary. Artifacts:

489. *Dentalium* beads, 11 (8 incised) at head

Burial 22 (pl. 25, *a*): 30L2, 2.5′ N., 0.5′ W., −11.2 DD. Origin: burial was 3.0′ from surface in second layer of sparse midden, although it was not possible to trace a pit line it is likely that the origin was in the first layer of light sand with midden. Deposition: on back, face to left, legs folded to right, semiflexed, head SW. Sex: M. Age: middle aged. Condition: complete, but decayed, poor. Artifacts:

462. Dentalia, 41, none perfect, at least 4 engraved (pls. 24, *a*, 10, and 25, *a*)
463. (?). *Olivella* shell beads, 38, small, all with tips ground off (pl. 24, *a*, 2)
485. (?). Blade, broken, petrified wood (pl. 21, *b*, 21)

The dentalia were worn in a sort of fillet around the head. After, or during, burial the band presumably slipped down over the right eye. The enlargement of a field photograph shows how the beads were strung on the fillet with the points of the shells to points and the large openings facing. The band was six to eight shells wide. The shell in the mouth of the burial was probably a fortuitous occurrence.

Burial 23 (pls. 10 and 11, fig. 1): 31L3, 1.0′ N., 9.0′ W., −11.2 DD. Origin: first midden layer, top of the plank cist was 0.6′ below surface. As there was no evidence of change in this 0.6′, it would appear that the burial was recent, that the plank cist was burned off near the present surface, and that only a small amount of fill has accumulated since the burial. Of this fill, 0.2′ to 0.3′ were laid down by the 1948 flood or at least are the work of the last few years. The cist was 2.5′ deep, 3.0′ NE.–SW. × 2.0′ NW.–SE. at top and 4.1 × 2.4′, same directions, bottom. It thus formed a truncated cone; as can be seen in the illustrations. This slanted off center toward the SW. It was made of a dozen rough, now dry-rotten, cedar planks or slabs which varied from 2.5′ long by 0.6′ wide by 0.15′ thick to about one-half the last two measurements. The shortest plank was about 2.0′ long. Deposition: on back just below bottom of planks, arms at sides, knees up and to right, partly flexed, head NE. Sex: M?. Age: young adult. Condition: poor, skeleton complete but decayed. Artifacts:

530. Plank cist fragments, 2 pieces
591. Wrapping fragments (grave appears to have been lined); see "Perishable Artifacts"
636. Juniper seed beads, on chest and beneath chin } pls. 31, 47, and 32, *a*, 1
637. Knife, iron, hafted, on chest }

Although burial 23 is no doubt recent, it will be noted that it is badly decayed—a circumstance which apparently has little to do with the age of the interment. An excessive amount of charred organic material was not noted around the top of the burned off cist (see burial 25).

Burial 24; 30L4, 6.0′ N., 9.0′ W., −10.1 DD. Origin: was 1.4′ from surface in, and probably inclusive in, the first layer of sandy midden: there was no break through the surface layer. Deposition: on back, left hand at pubis, right hand at side, feet at pelvis, knees to right, semiflexed, head SW. Sex: M. Age: middle aged adult. Condition: fairly complete but poor. Artifacts:

531. File or whetstone, volcanic scoria, within left elbow (pl. 19, *b*, 3)
532. Pipe, short tubular, steatite, hole in side of bowl (pl. 19, *b*, 8)
533. Drill, chalcedony; below (NW. of) pelvis (pl. 22, 36)
534. Red ocher, small pieces; around skull and torso
535. Kingfisher bill, fragmentary; at neck, right side (pl. 23, *b*)
536. Do.
537. Scraper, brownish coarse agate; within left elbow
546. Matting, twined?; over most of bones especially on right side covering ribs. See "Perishable Artifacts," page 117.
552. Wood; on left side over ribs
556. Soil, greenish earth, probably decayed copper; beneath burial
708. Iron, scrap; found in laboratory (pl. 31, 45)

Burial 25 (pl. 12): 32L5, 8.0′ N., 3.5′ W., −10.5 DD. Origin: Burial itself was 2.2′ from surface. Top of plank cist which enclosed burial was 1.1′ from the surface and 1.1′ above burial. The cist thus originated in the first sandy-midden layer. There was extensive evidence of fire at the top of the cist. The planks, similar to those of burial 23, were burned off even. Burned salmon bones, fused sand, and ash all attested to a hot fire. It cannot be stated with certainty that the bones were remains of food thrown into the fire. They might have been debris in the sand, but the feeling of the excavators was that they were too numerous in this spot to have been accidental. It will be noted that there are a number of artifacts with this burial that are generally associated only with males, pipes, iron arrowheads, etc. Perhaps burial 25 was a transvestite shaman although Ray (1942) does not record them for the area (see burial 48). Deposition: at bottom of cist, on back, knees under chin, tightly flexed, head W. Sex: F. Age: adult. Condition: complete, badly decayed, poor. Artifacts: in the field this burial was called the female shaman because of the large number of associated nonutilitarian artifacts. All artifacts are shown in plate 12, *b;* only secondary illustrations are listed below.

452. *Otivella* shell bead, tip ground off
464. 3 flat stone beads, steatite; 0.4′ out from right shoulder (pl. 19, *b*, 16)
473. Iron blade, leaf-shaped; on left side of lower abdomen (pl. 31, 27)
474. Smooth stone, hook-shaped, natural; at left side and inside left elbow (pl. 20, *a*, 10)
475. Smooth stone, shaped like bird effigy, natural; at left side and inside of left elbow (pl. 20, *a*, 9)
476. Iron tube or ferrule, long, 2 fragments; at left side, low (pl. 31, 26)
477. Scraper, flake or brownish flint; at left side, low (pl. 21, *b*, 6)
484. 9 *Olivella* shells, tips ground off, and 4½″ string of juniper seed beads; on right side of abdomen above pelvis
514. Stone spoon, short handle, 1 tablespoon size, steatite; at right side of chest (pl. 19. *b*, 7)
515. Tubular pipe, small, steatite; at right side of chest (pl. 19, *b*, 14)

516. 2 canine teeth, points ground; and bone tube bead; probably strung around neck; near right shoulder
517. Celt, broken, green serpentine; to right of neck 0.3′ (pl. 19, *b*, 5)
518. Blade, hafted, short (or point); dark chert; over right side of abdomen (pls. 22, 13; 26, *b*)
519 (?). Point of blade, petrified wood; 0.3′ out from left shoulder
520. Smooth stone, banana-shaped, natural (pl. 20, *a*, 14)
521. Smooth stone, mound-shaped, unaltered (pl. 20, *a*, 13)
522. Smooth stone, mortar-shaped, unaltered (pl. 20, *a*, 12)
523. Scraper, crude chipped flake of brownish chalcedony; out from pelvis, left side
524. Scraper, flake of brownish flint, at left side
525. 3 bear canines, large; at left side of pelvis, low
526. Smooth stone, cup-shaped, unaltered (pl. 20, *a*, 8)
527. Tooth (elk incisor?); at left of pelvis, low
528. 3 carved bone pieces; very fragmentary, cup-shaped depressions on surface and notches around edges; at right side of chest
529. Iron bracelet, 2 fragments; at right side of chest (pl. 31, 31)
538. 3 bone beads, probably part of No. 516; at right side of chest
539. Tooth pendant grooved at root; canine; right side of chest
540. Juniper seed beads, 2″ string, copper bead fragment, brown jasper flake with edges retouched, and iron fragments (pls. 21, *b*, 12; 31, 32; 32, 3, 4)
541. Blade, crude, brown-gray chalcedony; at left side within left elbow
542. Smooth stone, shaped like animal claw, unaltered (pl. 20, *a*, 11) near No. 474
543. 2 bird talon cores, large hawk (?); at left side of throat under chin (pl. 23, *a*, 12)
544. 17 *Olivella* and 21½″ string of juniper seed beads, 1 *Glycymeris* fragment; under right side of head
572. Antler digging-stick handle, fragmentary; at left side within elbow (pl. 23, *a*, 2)
639. Matting in block of soil, body covering; piece from over midriff. See "Perishable Artifacts," page 117
693. 2 drilled claw cores, bear, large, broken, found in laboratory
705. Fish teeth in jaw fragment are copper stained (associated with burial 25a; found in laboratory (rt. phryngeal teeth—family Cyprinidae of *Ptychocheilus* sp. (Dunkle)
706. Iron fragment fused to bone (associated with burials 25 or 25a) found in laboratory (pl. 31, 43)
707. Iron fragment centered in bone (associated with burials 25 or 25a) found in laboratory (pl. 31, 44)

Burial 25a: infant (3–6 mos.) bones found on chest of burial 25.

Burial 26 (pl. 15, *b*): 30L5, 7.0′ N., 7.5′ W., −9.5 DD. Origin: burial was 0.7′ from surface and certainly inclusive in the first sandy midden layer. Deposition: on back, probably extended, head W. Sex: ?. Age: infant, 12-16 months. Condition: only part of the skull remained. Artifacts (the following descriptive locations are interpolations; all artifacts are shown in plate 15, *b*; those noted below are secondary illustrations):

497. Flat stone effigy, large, slate (pl. 20, *a*, 26)
498. Bone awl (?), fragmentary; probably at right shoulder
499. Bone pin, fragmentary; at right side of burial
500. Antler wedge (?), fragmentary; at right side and partly over chest

501. Blade, large, with remnants of hafting; at left side (pl. 26, *c*)
502. Point, medium size, broken, obsidian; over left side of lower abdomen or pelvis
503. Blade, broken, reddish chalcedony; at left side
504. Flat stone effigy, oval, pine tree design, soft slate; below pelvis, well to left (pl. 20, *a*, 23)
547. Bone or antler artifact (wedge?); at left side, center
548. (?). Piece of travertine, unaltered, near area of feet
549. (?). Copper pendant, roughly square, small (button?) near feet
550. Scraper, yellow-brown chalcedony flake, retouched, over pelvis
551. Shaped piece of volcanic ash, wedge or chisel shaped; over pelvis
553. Effigy, flat stone, wedge shaped with face and body incisions, semi-realistic; at right side of neck below skull (pl. 20, *a*, 25)
554. Copper pendant, rectangular; at left side of face (pl. 30, 5)
685. Red ocher
686. River mussel shells (*Margaritifera margaritifera falcata* (Gould)), 8 large half shells and small fragments
694. Red ocher, found in laboratory.

The mussel shells were in three groups in the grave: one group (2 shells) near specimen No. 503 at left side of pelvis or legs; another (2 shells) somewhat closer to the burial; and a third (4 shells) at right side of the burial about at lower thorax. All of these were half shells, open face up. A possible fragment of what may have been a very poor plank cist was found on the left side of the burial, one foot out from the head. The effigies and red ocher with this burial of an infant indicate a ceremonial association unusual for any but adults.

Burial 27: 31L6, 4.0′ N., 0.0′ W., −10.2 DD. Origin: surface disturbed here but the burial certainly was inclusive in the first sandy light midden layer. Deposition: on back, head up with chin on chest, legs loosely bent, extended, head to W. Sex: ? Age: child 4–6 years. Condition: fragmentary and poor. Artifacts:

466. 1 *Dentalium* bead, broken; at left pelvic bone
467. 1 *Dentalium* bead, broken; beneath chin
468. 1 shell disk bead, perforated; beneath chin

There was a layer of wood or very heavy mat underneath the burial. No structure remained.

28. (This number was not used.)

Burial 29: 33L5, 7.0′ N., 4.5′ W., −10.8 DD. Origin: was 2.0′ from surface, no cist or pit seen but burial was probably inclusive in very bottom of first sandy midden layer. Deposition: on back, knees folded to left, face to E. and up, right hand on chest, flexed, head S. Sex: M. Age: young adult. Condition: incomplete, poor. Artifacts:

574. Red ocher and 2″ string of juniper seed beads; over chest
575. 4 iron objects; at left side of skull, adhering to face bones; blade and conical point (?) included (pl. 31, 37)
577. Projectile point, small, broken, gray chalcedony, at right side over ribs
629. Beads, 1½″ string, juniper seeds
687. Beads, 2″ string, juniper seeds

Burial 30: 33L5, 5.0′ N., 7.0′ W., −11.1 DD. Origin: burial lay at 2.4′ from surface and probably, although not certainly, was intrusive into the second sandy light midden layer from the first. No grave was observed. Deposition: on right side, face to E. (?), flexed, head to S. (?). Sex: ?. Age: child 4–6 years. Condition: fragmentary, poor. Artifacts:

576. Point, small triangular, gray chalcedony, on chest

Burial 31: 33L5, 5.0′ N., 6.0′ W., −11.1 DD. Origin: same as burial 30. Deposition: right side?, semiflexed, head SW. Sex: ?. Age: child 6–7 years. Condition: poor, decayed. Artifacts: none. Occasional bits of decayed shell, not identifiable, were noted adhering to bones.

Burial 32: 33L5, 4.5′ N., 7.0′ W., −11.4 DD. Origin: burial lay at 2.6′ from surface. Part of the plank cist was found near the disturbed feet of this burial but 0.8′ from the surface. This substantiates the origin for the burial and probably 30 and 31 as the top midden layer. Deposition: on back, knees to left, arms at sides, semiflexed, head to W. Sex: F. Age: young adult (?). Condition: disturbed and decayed. Artifacts:

560. 6 iron objects, including remains of 1 large blade, 1 tube and other pieces; near torso (pl. 31, 34)
561. 2 copper fragments; near torso
573. pestle, broken (the two large pieces of this long, tapered pestle lay neatly stacked near where the decayed feet of this burial would have been; the third piece, the tip, lay in the area where the destroyed skull once lay; this is a clear case of "killing" of this artifact (pl. 20, *b*, 1)
710. Iron embedded in bone and wood, possibly tip of blade in sheath with bone bound together by corrosion; found in laboratory (pl. 31, 46)
711. Soil sample; center right humerus
712. Soil sample; center left humerus

Burial 33 (pl. 13, *a*): 30L5, 6.0′ N., 3.5′ W., −10.1 DD. Origin: the cist was 0.9′ from surface, cist and burial were inclusive in the first sand and midden layer; half of a rectangular (?) plank cist protected the north and east side of the burial. A bit of this also remained near the head on the southwest. Remainder of cist not traceable. Greatest diameters of cist were (?) 3.2′ SW.–NE. and 2.0′ NW.–SE. Cist shallow: about 1.0′ deep. Deposition: on back, hands over pelvis, knees at left, feet at pelvis, semiflexed, head SW. Sex: F. Age: adult. Condition: fair. Artifacts:

635. Matting covering burial 33 (was at least half-shrouded in this mat); see "Perishable Artifacts," page 117.

It was noted that the bottom of this grave was slightly indurated. It may have been tamped when made and/or a slight mineral binding may have taken place during decay.

Burial 34: 32L5, 2.0′ N., 3.5′ W., −10.7 DD. Origin: 2.0′ from surface. No pit was traceable until even with the burial. The latter appears, thus, to be inclusive in the second layer of very sparse midden content. Deposition: on back, hands on stomach, knees to right, semiflexed, head W. Sex: F. Age: adult. Condition: poor. Artifacts:

557. Iron objects, 2 blade fragments in hafts and with sheath fragments; over left clavicle (pl. 31, 33)
558. Unio of large pelecypod, below chin (pl. 24, *a*, 16)

This burial was wrapped in matting (none saved) and there was a heavy organic brown area over and through the middle of the burial. This suggests a deposit of perishables, baskets, etc.

Burial 35 (fig. 1): 32L5, 8.0′ N, 7.5′ W., −11.0 DD. Origin: Plank cist was circa 1.3′ from surface. The grave was intrusive from the first sandy midden layer into the second, even less rich, midden layer. At 1.3′ from the surface the top of the cist was an eccentric oval 3.4′ N.–S.×2.0′ E.–W.; 0.8′ below that the bottom of the cist was a symmetrical oval 3.0′×2.3′. The burial, 0.3′ below this point, was then below the short walls of the cist. Deposition: on back, and right side, face

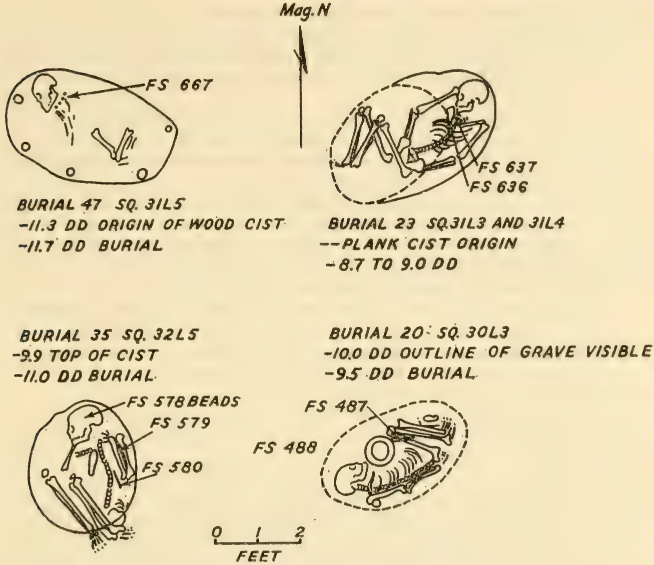

Mag. N
FS 667
BURIAL 47 SQ. 31L5
-11.3 DD ORIGIN OF WOOD CIST
-11.7 DD BURIAL
FS 637
FS 636
BURIAL 23 SQ.31L3 AND 31L4
--PLANK CIST ORIGIN
-8.7 TO 9.0 DD
BURIAL 35 SQ. 32L5
-9.9 TOP OF CIST
-11.0 DD BURIAL
FS 578 BEADS
FS 579
FS 580
BURIAL 20 SQ. 30L3
-10.0 DD OUTLINE OF GRAVE VISIBLE
-9.5 DD BURIAL
FS 487
FS 488
0 1 2
FEET

Figure 1.—*Field sketches of burials.*

W., hands at shoulder and chest, knees folded to right, flexed, head N. Sex: M. Age: middle-aged adult. Condition: fair, complete but decayed. Artifacts:

578. 1 juniper seed bead; on skull
579. Antler digging-stick handle, fragmentary, by left arm.
580. Antler pin, decayed: lay along central vertebrae

The burial was wrapped in matting (none saved) and there was an area of stain around the bones.

Burial 36 (pl. 13, *b*, and 14, *a*): 32L5, 3.5′ N., 7.5′ W., −11.0 DD. Origin: while the burial lay at 2.3′ from the surface, the origin of the plank cist which protected it was about 0.7′ from the surface. Thus the grave originated in the first midden layer. Unfortunately, this cist was not traceable much more than 0.6′ below the slightly charred top of the planks. The top dimensions of the oval cist were 2.7′ N.–S.×2.4′ E.–W. The dimensions of the dark area of the grave outline of the burial were 4.3′ NE.–SW. and 2.8′ SE.–NW. A few wood bits were found at body level; the body was well shrouded. The cist was thus more sharply conical than that of burial 23. The cist planks must have been around 1.7′ long unless the very short cone at some distance above the burial was the extent of this cist. Deposition: on back and left side, hands at pelvis, knees folded left, loose flexure, head NE. Sex: M. Age: middle-aged adult. Condition: complete but decayed, poor. Artifacts: all burial 36 artifacts are in plate 13, *b*, and 14, *a*; those listed below as illustrated are shown a second time in another context.

607. Stone pipe, tubular, long, small hole in barrel, steatite; by left elbow and across left femur (pl. 19, *b*, 9)

608. 9 juniper seed beads; under chin and on chest
609. Hafted blade, long, square butt, probably knife; at left side between arm and chest. See "Perishable Artifacts," page 111 (pl. 26, *a*)
610. Antler wedge or scraper, very fragmentary; across lower legs, see artifact 772.
611. Yellow ocher (limonite), small piece; near head and face
612. Point, small, side-notched, red jasper; in front of face (pl. 22, 19)
613. Whetstone, triangular, of scorious lava; between head and right shoulder (pl. 19, *b*, 4)
614. Point, small, stemmed with basal notches, white flint; between head and right shoulder (pl. 22, 33)
615. Basketry hat; on skull. See "Perishable Artifacts," page 116 (pl. 27, *a*)
616. Green tuffaceous sandstone; small lumps, on right shoulder
618. Silver pendant, small; by left humerus (pl. 31, 39)
619. Stone pendant, formerly stem end of tubular pipe; behind pelvis (pl. 19, *b*, 15)
620. Point, broken, petrified wood; on right shoulder
621. Worked flint, blade fragment (?), on right shoulder
622. *Olivella* shell, end ground off; behind pelvis
623. Bone bead, incised; right shoulder, decayed and unable to save
624. Coiled basket fragments; by feet and below them (pl. 25, *c*)
625. Carved bone tube bead, on occiput
626. Flake, retouched, white flint; position unknown
627. Flake, large, retouched, brown chalcedony (pl. 21, *b*, 2)
628. Tubular stone pipe, small, ornamented, steatite; under mandible
632. Point, expanding stem, basal notched, chalcedony; at left elbow
709. Worked bone, cut at one end, stained with red ocher, found in laboratory
772. Antler wedge (?), very thin; part of artifact 610. See discussion under "Bone and Antler" (pl. 23, *a*, 5)

See "Perishable Artifacts" for discussion of the perishable material recovered. There were at least four baskets or wooden bowls with the burial.

Burial 37: 31L5, 7.8′ N., 3.0′ W., −11.2 DD. Origin: the top of the cist was 0.8′ below the surface; it thus had its origin in the first layer of sand and midden. The bottom of the cist was 2.2′ below this. The cist walls came down to about the median point of the burial—which lay at 2.2′ below the surface or −11.2 DD. The top of the cist was a flattened oval with its longest diameter 2.5′ NE.–SW. and a NW.–SE. width of 2.0′. It should be mentioned that the shortest diameter above (NW.–SE.) is the longest of the burial itself. Hence it is not possible to predict burial orientation from the top of the cone of the plank cist. The NE.–SW. diameter remained about the same, expanding only about 0.3′ at the level of the burial, but the staves that formed the other sides, especially the northwest, slanted outward at a sharp angle to accommodate the burial. Again, it was certain that the wood protection was put in after the burial was made. There was no evidence of burning at the "top" of the cist. The planks, which were badly decayed and not always traceable, were about 2.0′ long. Deposition: on left side, hands at chin, in tight flexure, head W. Sex: F. Age: middle-aged adult. Condition: complete but poor. Artifacts:

453. Parts of plank cist, 3 pieces of wood
602. Pestle, tapered, igneous rock, small; in front of face
603. Blade, large, oval; behind head lying lengthwise (pl. 22, 7)
631. Juniper seed beads, 8½″ string; around neck and right wrist

The pestle appeared to be lying partly in a round basket which was itself in or on a square container. The whole (with the burial) was wrapped or shrouded in hide or fine matting, possibly cloth. The containers with the pestle were no more than dark-brown lines in the lighter sand and no further information could be gained from them.

Burial 38: 33L5, 1.6′ N., 6.8′ W., −11.4 DD. Origin: the burial lay at 2.6′ below the surface. While the bulk of the body was thus in the upper part of the second sandy-light midden layer, the knees were at −10.4 DD, only 1.9′ below the surface and in the level of the first layer. No cist or pit was traceable at this level but the peculiar placement of the legs indicates that the burial was intrusive from the first layer. At the burial level itself there was some evidence, a curved dark line in the sand, of an oval cist or very heavy grave lining along the south side of the burial and about 0.5′ from it. Deposition: disturbed by river wash, on back, arms at sides, feet near pelvis and knees up, semiflexed, head W. Sex: F. Age: adult. Condition: fragmentary, poor, Artifacts:

562. Two iron bracelets, rusted together; at right elbow (pl. 31, 35)
563. Iron, 2 fragments of long tube, possibly pipestem; outside of right elbow (pl. 31, 36; 32, *a*, 5)
601. Iron knife blade, leaf-shaped; above lower lumbar vertebrae (pl. 31, 38)

The skull and mandible of this burial, together with much of the overburden, were removed by water.

Burial 39 (pl. 14, *b*): 30L5, 9.0′ N., 5.0′ W., −10.5 DD. Origin: burial lay 1.8′ below the surface. The fragmentary cist, as far as could be seen, originated 0.5′ above this. Thus the burial originated in the upper sandy stratum and penetrated the lower. The cist was fragmentary, only the section around the knees was found. Deposition: on back, knees folded to right, right arm across torso, left hand on chest, semiflexed, head WSW. Sex: F. Age: middle-aged adult. Condition: poor. Artifacts (all burial 39 artifacts are shown in plate 14, *b*; those listed below are secondary illustrations):

564. Smooth stone, unaltered, oval; left side near pelvis (pl. 20, *a*, 15)
565. Smooth stone, oval, unaltered, left side near pelvis
566. Flat stone effigy, small, slate, modified headdress design at one end; left side near pelvis (pl. 20 *a*, 16)
567. Flat stone, large, blunted oval, smeared with red ocher, otherwise same as above (pl. 20, *a*, 18) slate
568. Antler pieces, left of skull 0.2′; probably parts of digging-stick handle (artifact discarded, completely disintegrated)
569. Part of digging-stick handle; very fragmentary; at feet
570. Flat shell bead, large, drilled; near right wrist above pelvis
571. Red ocher, large pieces; at right side
581. Wooden piece, diagonally across torso pointing toward No. 569 (part of cist?)
582. Antler digging-stick handle (?); over right shoulder and along right side of face
583. Twined matting fragment; *Apocynum*; from over chest
584. 41 *Olivella* fragments and 30″ string of juniper seed beads, 9 fragmentary dentalia; 9 elk canines (pl. 23, *a*, 11), perforated; 1 copper pendant, small
585. Arrowshaft smoother, volcanic tuff, broken into 3 pieces, repaired, diagonal groove; outside of left forearm (pl. 19, *a*, 13)
586. Scraper, oval, flake, mottled chalcedony; below left elbow (pl. 21, *b*, 9)

587. Flat stone effigy, oval, headdress design at more pointed end; between feet and pelvis (pl. 20, *a*, 20).
588. Flat stone effigy, same as No. 587, both slate
589. Smooth stone, oval, unaltered
590. Flat slate effigy, large, headdress design at one end, stained with red ocher, same location—between feet and pelvis (pl. 20, *a*, 19)
592. Flat slate effigy, smaller than No. 590, between feet and pelvis (pl. 20, *a*, 17)
593. Copper pendant, right side of face
594. Do.
640. Arrowshaft smoother, large, broken in 3 pieces, volcanic tuff; pairs with No. 585 (pl. 19, *a*, 12)
641. Pestle, tapered, broken in 3 pieces, large, basalt
668. Soil sample
713. Juniper seed beads, 9″ string, with 6 dentalia fragments, found in laboratory
714. *Olivella* shell, one, broken, found in laboratory

Peculiarly, it was not possible to decide, in the field, if burials 39 and 40 were or were not in the same grave. The fragment of the cist, if extended logically along its curve, would have passed between them. One of the lessons learned early was that the cists were not symmetrical, so the above observation carries little weight. As the cist could not be found between the two burials, I incline to the belief that it was destroyed by burial 40, and that the latter is, in a measure, intrusive into and subsequent to burial 39.

Burial 40: 30L5, 7.6′ N., 5.0′ W., −10.5 DD. Origin: the same remarks apply as to burial 39. See also final discussion under that burial. Deposition: on back, head W. Sex: ? Age: adult. Condition: poor, no bones saved. Artifacts: none (unless buried with burial 39):

Burial 41 (pl. 15, *a* and *b*): 31L5, 6.5′ N., 6.5′ W., −11.3 DD. Origin: lay at 2.7′ from the surface. Remains of a plank cist or heavy grave lining were noted at the burial level but not above. Therefore, it must remain undecided whether or not this burial, like most, had its origin in the first and most superficial midden layer. Deposition: on back, arms at side, knees to left, feet close to pelvis, face N., semiflexed, head W. Sex: M. Age: middle-aged adult. Condition: complete, poor. Artifacts: all artifacts with this burial are illustrated in plate 15, *b*. Those noted below are secondary illustrations.

595. Arrowshaft smoother, broken (2 pieces, repaired), outside of left elbow, small, diagonal grooved, volcanic tuff (pl. 19, *a*, 4)
596. Arrowshaft smoother, pairs with No. 595, small diagonal grooved, volcanic tuff (pl. 19, *a*, 3)
597. Pendant, serpentine, irregular shape, resting on right side of mandible (pl. 19, *b*, 11)
598. Bird bone whistle, ulna of Golden Eagle, broken; on left shoulder and chest, along humerus
599. Drill, petrified wood (broken in 2 pieces); on lower ribs
600. *Olivella* shells, 4 large, with tips ground off; left of burial and below No. 596
605. Juniper seed beads, 2″ string; along vertebrae
606. Green tuffaceous sandstone; along vertebrae

This was a very large person.

Burial 42 (pl. 16, *a*): Sq. 31L5, 2.8′ N., 7.0′ W., −11.0 DD at skull and −11.9 DD at pelvis. Origin: cist was at −9.6 DD. thus, in the first sandy-light midden layer. The burial was intrusive into the second layer from the first. Deposition:

on back, arms beneath body, pelvis was lower than body and rotated to left and the knees were below the pelvis to the left; loosely flexed; head W. Sex: F. Age: young adult. Condition: good, complete. Artifacts:

671. Shell beads, 8 disk with central hole; 4 pieces *Dentalium* shell beads *Dentalium pretiosum* Sowerby; under right side of mandible (pl. 24, *a*, 6, and 24, *b*, 6, 9)

This burial lay in a peculiar and contorted position. The cist was open to the west. It is likely that the burial so filled the grave that it was not possible to plank this side. The top of the cist was burned off and some bones were found in the burn.

Burial 43: Sq. 30L5, 9.0′ N., .4′ W., −10.5 DD. Origin: burial was 2.4′ from surface and thus within the second sand and midden layer. As the fragment of the cist was approximately at a level with the burial's head this did not give much help as to origin. Experience indicates that the cist would have been found in the first layer had it been well enough preserved. Deposition: on back, arms at sides, right hand at pelvis, knees folded to left, semiflexed, head WNW. Sex: F. Age: young adult. Condition: complete but shattered, poor. Artifacts:

663. Pestle, small, tapered, basalt; outside of left elbow (pl. 20, *b*, 5)
664. Hafted triangular blade; at right hand. See "Perishable Artifacts."
665. Bark (?), grave lining or shrouding fragments; over abdomen.
666. Projectile point, broken, petrified wood; inside right forearm.

The burial was at least partly shrouded in bark or hide.

Burial 44: Sq. 33L5, 2.8′ N. at skull, 2.3′ W., −10.6 DD. Origin: burial badly disturbed by burial of burial 45; skull was 1.9′ below surface. Several bones of this burial—hand and forearm, femur and lower leg, some vertebrae—lay in proper juxtoposition. Therefore, the disturbance must have taken place before decay of the tendons was complete. It seems peculiar that the memories of the Indians should have been so short that they would have accidently dug into a recent grave. There appears to be, however, no other interpretation to offer. Thus the origin of burial 44 must remain uncertain. Deposition: ?, head probably W. Sex: M. Age: middle-aged adult. Condition: incomplete, fair. Artifacts: here the artifacts which lay on or very near the closely flexed burial 45 have been assigned to that burial. Those that were scattered are assigned to burial 44. Actually it would be impossible to substantiate this logical distribution.

392. See below, No. 643, part of pestle
643. Pestle, broken 2 pieces, tapered greenish diorite porphyry (part of this is 392) (pl. 20, *b*, 2)
644. Digging-stick handle, antler, Nos. 644 and 645 are the 2 parts of this large handle; 1.8′ SW. of skull
645. Digging-stick handle, antler, Nos. 644 and 645 are parts of same (pl. 23, *a*, 1)
646. 46 *Olivella* shells, all with tips ground off; 1.4′ N. of skull (pl. 24, *a*, 1)
647. Iron implement, large blade, fragmentary, remnants of hafting, N. of skull (pl. 31, 40)
650. (Ulna) awl, fragmentary; 1.7′ E. of skull (pl. 23, *a*, 24)

Burial 45: Sq. 33L5, 3.0′ N., 2.0′ W., −11.1 DD. Origin: this burial lay 2.3′ below the surface. However, the top of its plank cist was encountered only 0.6′ below the surface. Thus, the grave originated in the upper sand and midden layer and just penetrated the second. As this grave gives a clue to some of the burial processes it might be wise to go into it rather fully. In the first place the cist is definitely off center to the south for burial 45. The fact, however, that most of the bones of burial 44 lay over and/or to the south of burial 45 indicates that the second burial was not centered exactly in its grave—presumably the area of disturbance was the area dug into by the second (burial 45 grave). This, following the argument, indicates that the grave itself was much larger than a mere hole the size of the presumably shrouded and flexed burial. From the farthest extent of the scattered bones of burial 44 we get an E.–W. diameter of 3.5′ and a N.–S. one of 4.1′. The largest dimensions of burial 45 are 2.8′ E.–W. and 1.8′ N.–S. Admittedly, rodents could, and probably did, move some morsels out from the grave and increase the largest dimensions above, but they did not move the larger bones. The cone of the wood cist extended down only a little over 1.2′. The planks thus fall short of the burial by 0.5′. A similar situation was noted by Collier et al. (1942, p. 40). The tops of the plank cist had been burned off and many animal bones, charred, were collected from the burn.

From the above observations we can state that, unless this is an exceptional case caused by an unexpected intrusion into a prior burial, graves were originally excavated a good deal larger than necessary. This might well have been, here at BN–3, a function of the loose sandy soil. After the burial was placed in the grave and probably covered with soil, the cone of wood was formed by shoving the ends into the loose earth of the grave fill. More earth was thrown in, and a fire was lighted to burn the tops of the planks or pieces off evenly—and perhaps for ceremonial purposes. This last is suggested by the bones often found in the ashes at the upper parts of the cists, intimating that the fire had been "fed." The whole was given a final covering of earth, apparently very shallow. The fact that the cone was, in this particular instance, far from being directly above the burial which it was intended to protect (?) indicates either carelessness in the burial ritual or that there was a considerable temporal hiatus between covering the body and cist construction. Either explanation is plausible. It may be that other sites will yield details that will enable us to use the above with more (or less) certainty as to its accuracy or even to lend it historical worth.

The cist was 2.6′ NW.–SE. and 2.3′ SW.–NE. at the top. The sides slanted outward gently. Deposition: on back, right arm at side, knees folded over chest, feet at pelvis, flexed, head W. Sex: F. Age: young adult. Condition: complete, fair. Artifacts (see statements on this point in description of burial 44):

642. Stone mallet, broken, both pieces at right side of head (pl. 21, *a*, 3)
648. Iron knife, 2 pieces, fragments of sheath (?); over left lower ribs (pl. 31, 41)
649. Juniper seed beads, 3″ string; on chest and at neck
674. Iron artifact, irregular shape; by right forearm (pl. 31, 42)
677. Projectile point, large, triangular; under pelvis
715 (?). Elk hyoid
717 (?). Awl (?), broken, found in the cist.

Burial 46 (pl. 16, *a*, shows the plank cist top above burial 42): Sq. 31L5, 4.7′ N., 7.5′ W., −11.1 DD. Origin: the plank cist was encountered at −9.6 DD and the burial lay at −11.1 DD. The burial was about 2.5′ from the surface. The origin was, as was usual, in the upper sandy-midden layer. Here the cist walls, on the south side (they were never found on the north) went down to the level of the burial. The planks were thus around 1.5′ in length. Burial 41 apparently destroyed the north side of the cist. In this connection it is interesting to note that burial 41 had no trade goods with it while burial 46 did. Thus, an absence of trade goods cannot mean an earlier burial. Burial 41 was in a better state of preservation—this is to be expected in view of the fact that it is an adult and later burial. The cist of burial 46 was probably oval and about 2.0′ E.–W. at its origin. It had been deformed and destroyed on the eastern and northern sides respectively. Deposition: (?), head probably west as beads are concentrated there. Sex: ? Age: infant or child. Condition: no bones recovered. Artifacts:

469. Wood fragments from top of cist
669. Copper pendant, broken, 2 pieces, irregular rectangle
670. Beads, 33 flat shell, drilled in center; and 1 large butterfly glass bead (probably a keeper for closing cord of Chinese spectacle case), small trade beads, and 3 dentalia fragments (pls. 24, *a*, 3; 29, *a*, 8)

There were a few small remnants of matting which showed that this burial had been shrouded. None was saved.

Burial 47 (fig. 1): Sq. 31L5, 3.0′ N., 4.0′ W., −11.7 DD. Origin: the badly decayed remnants of a cist appeared first at −11.3 DD—only 0.4′ above the burial. The burial itself lay 3.7′ below the surface. Thus, as far as could be seen in the field the burial was inclusive in the second loamy layer of very light midden. No certain statement can be made. There was, however, a peculiarity here that may enable us, with more experience, to decide on the age of the burial. The cist itself did not yield the pieces of decayed wood that usually indicated a cist. There was the dark, organic stained oval line of the grave (3.9′ NW.–SE. × 2.4′ SW.–NE.) and around the inside of this, on the east, south, and west sides, were possible postholes. The indications are that these posts, if such they were, not only outlined the grave but supported a lining. This may be a precedent, later, or variant form of the usual plank cist. Deposition: on right side, hand at chin, semiflexed, head NNW. Sex: ? Age: adult. Condition: no bones recovered. Artifacts:

667. Juniper seed beads, 9″ string; and 37 *Olivella* shells, tips ground off; at throat and neck.

Burial 48 (pl. 16, *b*, 17, *a*): Sq. 32L5, 4.6′ N., 1.2′ W., −11.6 DD. Origin: this burial lay 2.4′ from the surface. Although there was a definite oval grave outline at the body level and remnants of a plank cist were noted just above this, there is no information as to the actual origin of the burial. As matters now stand the situation is the same as with the preceding burial, and it was inclusive in the second layer. It is very possible that this is not so and that the decay of the cist removed evidence of the more superficial origin of the burial. Deposition: on back, knees to right, arms at sides, semiflexed, head NW. Sex: ? Age: child circa 10 years. Condition: poor, decayed fragmentary. Artifacts (see pl. 17, *a*):

634. Carved slate effigy; over lower leg bones
651. Copper pendant, small, hair adhering; left side of face
652. Hair (?); left side of skull
653. 10 smooth oval unaltered stones, powdered with red ocher (pl. 20, *a*, 1–5); 3 blanks for use as effigy stones also, 1 slate effigy stone.
654. Seeds (?) with soil from small basket (?); over right abdomen
655. Carved slate effigy; over left femur (pl. 20, *a*, 7)
656. Pestle, small, tapered, quartzite; at right shoulder (pl. 20, *b*, 4)
657. Digging-stick handle, antler, decorated, decayed; over midfemora
658. Point, stemless, crude, petrified wood; at right shoulder (pl. 22, 5)
659. Point, stemless, white flint; with haft (not joined) over left chest (pl. 22, 11)
660. Point, stemless, crude, petrified wood, at right shoulder
661. Juniper seed beads, 18″ string, and 1 *Olivella;* around neck
662. Digging-stick handle, antler, fragmentary; outside right arm
672. Teeth, 2 bear canines, fragmentary, between feet and pelvis
673. Digging-stick handle, antler, badly decayed
675. Carved stone flat effigy, slate; over lower pelvis near pubis (pl. 20, *a*, 6)

676. Tooth, beaver, fragmentary, parts of gaming piece (?) over lower pelvis near pubis

716. Tooth, beaver, incised, fragmentary (gaming piece?), found in laboratory

771. Antler wedge, fragment, found with No. 662 (pl. 23, *a*, 15)

While the remnants of the wooden bowls or baskets show well in the photograph, sliced off at about their midpoint, we were not able to save samples of them. The remains were powdery in the extreme.

This burial, a child, had extensive utilitarian and ceremonial paraphernalia associated with it.

Burial 49 (pl. 17, *b*): Sq. 32L5, 0.5′ N., 9.0′ W., −11.1 DD. Origin: this burial was 2.0′ from the surface. Again there was evidence of a plank cist but this was not traceable to a level much above the burial. It was noted, as a matter of fact, only along the southwestern side of the grave. Thus, from the available information, the burial must be accepted as inclusive in the lower loamy-midden layer. Deposition: on right side and back, right hand at chest, flexed, head WNW. Sex: M. Age: adult. Condition: complete but poor. Artifacts:

678. Arrowshaft smoother, large, coarse sandstone; over left shoulder. See No. 684 (pl. 19, *a*, 7)

679. Matting, preserved over and around body. See "Perishable Artifacts" (p. 117)

680. Stone scraper (possibly hafted), petrified wood; over lower legs (pl. 21, *b*, 5)

681. Copper pendant, small; between left femur and tibia (pl. 30, 15)

682. Antler wedge (?), and other bone fragments; over abdomen and legs

683. Stone drill, expanding base, white flint; over left ribs (pl. 22, 37)

684. Arrowshaft smoother, large coarse sandstone; pairs with No. 678; at left shoulder (pl. 19, *a*, 8)

773. Deer metatarsal, decayed, shows no alteration, found with No. 682.

Burial 50: Sq. 27L5, 9.8′ N., 4.0′ W., −9.4 DD. Origin: this infant burial was only a few tenths of a foot below the surface. The burial was removed without the usual recording procedure. Deposition: ? Sex: ? Age: infant. Condition: fair. Artifacts:

403. Cache of 20 *Dentalium* shells, 16 of these incised. One shell has a small blue trade bead inside (pl. 24, *a*, 7; *b*, 2, 3).

ADDITIONAL BURIALS

During the next (1949) season on the Columbia, 45-BN-3 was revisited. Parts of four more burials were found in the holes left by collectors. These were removed with some artifacts. Of these burials BN3/B51, 52, 53, and 54, only burial 52 could be properly recorded. Data on the artifacts found and on burial 52 follow:

Burial 51: No artifacts.

Burial 52: Sq. 33L4, ca. 7.6′ N., 2.5′ W., −4.1 surface depth. Artifacts:

793. 11 chert scrapers

797. Broken antler digging-stick handle, large, elk

798. Iron blade, knife

800. Triangular chalcedony blade

801. *Dentalium* shell bracelet with copper

Burial 53: 33 L4, ca. 2.5′N., 1.5′W., −3.0 S. D. Artifacts:

776. Arrowshaft smoother, sandstone, medial groove

777. Arrowshaft smoother, sandstone, medial groove, broken

778. Celt, serpentine, unfinished poll

779. Flake scraper, chalcedony
780. Stone drill, petrified wood, broken
781. Stone drill, petrified wood, broken
782. Pumice or infusorial earth
783. Scoria file, knife shaped (whetstone?)
784. Arrowshaft smoother, sandstone, typical medial groove
785. Arrowshaft smoother, sandstone, typical medial groove
786. Arrowshaft smoother, sandstone, typical medial groove, red ocher stained
787. Pumice or infusorial earth
788. Broken blade, petrified wood
789. Arrowshaft smoother, sandstone, typical
790. Pumice or infusorial earth
791. Stone ball, steatite
795. 17 bone beads, 3 small blades, 1 elk tooth, 1 beaver tooth, 4 disk shell beads, 5 dentalia, 13 *Olivella*, 11 juniper seed beads, 1 copper pendant, 1 lump green iron oxide, all together as if in pouch.
796 (a, b). Two twined matting fragments (pl. 27, *b*). See "Perishable Artifacts" (p. 117)

Burial 54: Sq. 33L4, ca. 1.0′N., 5.5′W., −4.3 S. D.
794. Iron knife blade, corroded
No matting

In addition to the above, another iron blade (like No. 794 a typical piece), a scoria file, and a mallet almost identical with No. 307 (pl. 21, *a*, 1) were found unassociated. Of the whole series only the stone ball or large bead (No. 791) and the mat fragment (No. 796) extended the already known artifact complex.

It was not possible to excavate any of the burials with great care but burial 53 did show some points of interest which can be recorded here. There was abundant red ocher around the burial. It lay semiflexed, head south on the right side. The bones along the spinal column were somewhat charred. The anterior part of the body showed no effects of heat. Probably this was not cremation but a fortuitous roasting of the corpse by the fire over its grave, if such there were. The bones were not saved.

The whole question of cremation and of partial burnings such as this is far from settled. Collector and semiprofessional excavations have been characteristic of Columbia River archeology for many years. Reports of cremations and partial cremations are numerous, but good descriptive work is nonexistent. Cremations range from the type of thing described by Krieger (1928, a, b) and Smith (1910, p. 142) to that mentioned above.

THE ARTIFACTS

GROUND AND CHIPPED STONE OBJECTS

Coarse hammers, choppers, pecking stones, or abraders, flake knives, and net sinkers form not only a bulky part of the collections, especially surface collections, from our sites but a numerically important one. At 45–BN–53, 121 of the 209 artifacts cataloged fall into one of the above-named categories. Site 45–BN–3, because of the vast number of copper ornaments and the finer burial furnishings, lagged far behind. There, only 77 of the 763 numbers were sinkers or heavy or crude tools. They will be discussed separately for the two sites. Plate 18 illustrates the types and appearance of these generalized tools.

As with most tools which are not specialized in function it is difficult to place them in tight descriptive categories. Taxonomy, it seems, should generally follow or make use of toolcraft. Where use is generalized, the classifier is apt to place the same artifact into two different categories (if he is striving for a rather fine division) on succeeding work days. Our workmen will use a hammer or chisel in a wide range of work. The same is true of a cobble hammerstone or chopper. Consequently, a taxonomy based on use and general shape is as beset with difficulty as one which attempts to use a number of rigid descriptive criteria. The latter, because of lack of adherence to strict pattern by the makers or users of a generalized artifact, are often of little value except as they fulfill a laboratory worker's need. Rigid description and judgments as to use or intent of use on the part of the maker should blend. The anthropologist is most fitted to classify on this basis and, indeed, is the only one who is so. To confine himself to a rigid descriptive framework, often almost mathematical, would not seem to be the best procedure.

45–BN–53

Cores

One core of fine black basalt, weight 12 ounces, was found. It appears to have been used as a source of flakes only.

Hammerstones

These are as varied as was their use. The latter included the extensive employment in pecking or abrading other hard stone to shape, striking flakes from cores, etc. There are three main categories in this group.

A. Three flat, roughly circular edge-battered cobbles.

Material: 2 igneous and 1 quartzite.
Size: diameters 6.5 cm. to 10 cm.
Weight: 7 oz. (BN–53/19; pl. 18, *a*, 7) to 1 lb. 1 oz.

B. One elongate, roughly cylindrical hammerstone, both ends used (BN–53/6, pl. 18, *a*, 1).

Material: diorite porphyry.
Size: length 13.3 cm., width 5.5 cm., thickness 4.2 cm.
Weight: 1 lb. 6 oz.

C. Sixteen large hammer or pecking stones (these may, in some cases, have seen use as choppers before the edges became dulled). One shows a pecked depression on one side—evidence of a specialized use (53/HP 11/47; pl. 18, *a*, 2).

Material: All of very tough igneous rock, large proportion of basalts (andesites and diorites are secondary). A single quartzite specimen shows little crumbling of the striking edges. It may have seen use primarily as a chopper. (Pl. 18, *a*, 2–4.)

Shape: Generally elongate cobbles with oval cross section. One or both ends used.

Size range	*Length (cm.)*	*Width (cm.)*	*Thickness (cm.)*	*Weight*
Greatest	16. 0	7. 8	3. 2	1 lb. 11 oz.
Least	9. 7	5. 7	2. 5	11 oz.
Median	10. 8	7. 6	3. 2	14 oz.

Choppers

These are flat to oval-rounded smooth river cobbles with chipping around most of the edge. Enough of the natural surface has been left to afford a good hand hold. These specimens fall into two main classes.

A. Thirteen cobbles with flakes removed on ends or around edges. The cutting bits are coarse but sharp and effective. The flakes were removed by percussion and generally from alternate sides. Flaking was sufficient to give an even edge. (53/HP 70/26; pl. 18, *a*, 8; and BN–53/HP 70/39, 21.)

Material: 3 of quartzite, 10 of fine basalts.

Size range	*Length (cm.)*	*Width (cm.)*	*Thickness (cm.)*	*Weight*
Greatest	14. 0	9. 0	5. 2	2 lb. 3 oz.
Least	7. 5	5. 5	1. 5	7 oz.
Median	11. 8	8. 5	4. 8	1 lb. 13 oz.

B. Ten flat, oval, cobbles, chipped on one end (usually), an edge or rarely in several places along the edges. These could have been hammers, choppers, digging tools, or, in some cases, naturally chipped pebbles. (BN–53/HP 70/21, pl. 18, *a*, 9; BN–53/5, 11, 12, 13.)

Material: 1 quartzite, remainder igneous (basalt, diorites, andesites).

Size range	*Length (cm.)*	*Width (cm.)*	*Thickness (cm.)*	*Weight*
Greatest	13. 8	9. 5	1. 8	1 lb. 2 oz.
Least	9. 4	7. 0	1. 5	8 oz.
Median	11. 4	8. 7	1. 6	12 oz.

Circular Pebble Scraper

Only one of these implements was found. It is a small flat cobble chipped to a circular shape. The chipping is coarse percussion work, the same as all choppers. With this particular example only the ends of what was presumably an oval pebble have been chipped back to form a circular piece. These pieces are probably scrapers or small choppers or pebble knives. It is possible that one end of a suitable oval pebble was chipped and used. When this became blunted the worker could turn it, use the blade as a grip and rechip the grip end with a few blows to form a blade. It would be simpler to chip from the rounded pebble surface than from the blade end, as the former offers a fair naturally prepared striking platform and the latter would splinter under attempts at further chipping. The circular form would result. (BN–53/7, pl. 18, *a*, 5.)

Material: Andesite.
Size: Length 6.4 cm., width 6.0 cm., thickness 1.3 cm.
Weight: 3 oz.

Flake or Spall Knives or Scrapers

There were 36 of these easily made tools found. Essentially they are simple flakes struck from a core, usually quartzite, used and thrown away. No doubt many of the flakes struck off during the manufacture of the large choppers would be picked up and placed in this category by the archeologist. The flakes are usually circular, size ranges are from 4 or 5 cm. to 14 or 16 cm. in diameter, with the median between 8 to 10 cm. Plate 18, *a*, 22–25, illustrates them. Secondary flaking is rare on any of these pieces.

Net Sinkers

Under this heading are two types. One is the usual 2- or 4-notched flat cobble sinker so common on the Pacific coast. The second is a type which, to my knowledge, has not appeared previously in the literature. It is not possible to be wholly certain that it is a sinker, but this seems the most reasonable assumption. They are rather like chipped geological specimens. Local collectors call them fish scalers, whether from accurate information or not has not been ascertained. These possible sinkers may be discussed first:

Rectangular chipped cobble net sinkers (?) (BN–53/6; pl. 18, *a*, 14; BN–53/4 *a*, 15, 16, 17, 18).—Twenty-four specimens were found. They are the typical flat cobbles of the beach that have been chipped and battered into a roughly rectangular shape. The chipped edges may extend around the whole piece or, and usually, one or both ends retain partly the unchipped surface. Usually the edges have been battered until thoroughly dulled. In only a few specimens do the edges appear to be as sharp as those of the choppers. This is one of the facts that has led to the belief that they are not chopping or scraping tools. The artifacts are very nearly all of a size with the exception of two very large ones. One (pl. 18, *a*, 14) has fairly sharp edges and it, or both of the large artifacts, may have served primarily as choppers. Both were of igneous material and measured about the same; 45–BN–53/6(14): length 16.5 cm., width 9.0 cm., thickness 3.9 cm., weight 2 lb. 8 oz.

Materials: Of the 24, only 4 are quartzite; the remainder are of basalts, granites, andesites, etc.

Size range	*Length (cm.)*	*Width (cm.)*	*Thickness (cm.)*	*Weight (oz.)*
Greatest	12. 6	6. 5	1. 8	15
Least	8. 8	4. 9	1. 5	5
Median	9. 7	6. 2	1. 8	8

Notched net sinkers.—At 45–BN–53 only 10 notched net sinkers were found. This is strange in view of the site's position and the large amount of other crude chipped stone found there. It can be suggested that the notched sinkers were not preferred at BN–53 and that their place was taken by the previously discussed rectangular sinkers (?). No four-notched examples were found—only the two-notched type. If it is correct that the rectangular objects are a kind of net sinker, it is possible that either a historical or cultural difference is indicated.

Material: All are basaltic

Size range	*Length (cm.)*	*Width (cm.)*	*Thickness (cm.)*	*Weight (oz.)*
Greatest	9. 0	7. 0	2. 0	6
Least	5. 5	4. 0	1. 1	2
Median	6. 2	5. 7	1. 0	3

45–BN–3

At this site there was a decidedly lighter concentration of all of the heavier, cruder implements than at BN–53. This is true even when one recalls that it was a smaller site. It is likely that the greater number at BN–53 was a result of the greater building activity, as evinced by the large number of house pits.

Cores

Two cores were found. Both could have also been used as choppers or scrapers. Blunting of the edges is a decided characteristic of the chert example (45–BN–3/4; pl. 18, *a*, 20).

Materials: 1 basalt, 1 brown chert.
Size: very nearly the same. Length 8.5 cm., width 6.5 cm., thickness 3.5 cm.
Weight: 8 oz. (basalt).

Hammer and Pecking Stones

Four like those of BN–53 were collected. The shapes vary but all have convenient grips and show extensive battering of any convenient surface.

Material: All of tough, igneous rocks of the area.

Size range	*Length (cm.)*	*Width (cm.)*	*Thickness (cm.)*	*Weight*
Greatest	15. 0	8. 5	4. 0	2 lb. 2 oz.
Least	9. 0	4. 6	2. 6	9 oz.

Choppers

A. Six single-bitted heavy choppers were brought to the laboratory. Shapes are varied as with those of BN–53, but all were made of round or oval cobbles. The grips fit the hand well and are large enough so that the shock of heavy blows would be distributed and absorbed. The jagged bits were shaped by the percussion removal of coarse heavy flakes. Often, but not invariably, flakes were removed on alternate sides. This gives an irregular appearance to the bit.

Material: 5 igneous (basaltic, etc. 438, pl. 18, *a*, 10) and 1 quartzite.

Size range	*Length (cm.)*	*Width (cm.)*	*Thickness (cm.)*	*Weight*
Greatest	10. 2	9. 5	4. 0	1 lb. 6 oz.
Least	8. 0	10. 5	3. 4	15 oz.

B. Three choppers, also of the same types as illustrated for BN–53, were made of flat instead of rounded and oval cobbles. The chipping extends around most of the circumference. The work is coarse and crude and the worked edges are battered.

Material: Basaltic.

Size range	*Length (cm.)*	*Width (cm.)*	*Thickness (cm.)*	*Weight (oz.)*
Greatest	9. 0	8. 0	2. 0	8
Least	7. 0	6. 2	1. 3	4

C. Five tools, choppers, digging or perhaps abrading tools were made from large, very flat cobbles. They were chipped at either or both ends but not around the sides. The result is a rather circular shape. One is a piece of laminated schistose rock chipped at one end. As a matter of fact, two of the smallest may be poor examples of two-notched net sinkers with battered instead of notched ends. The crudity of all of these choppers described places them in the "use and throw away" category.

Material: All igneous.

Size range	*Length (cm.)*	*Width (cm.)*	*Thickness (cm.)*	*Weight*
Greatest	12. 2	11. 5	1. 5	1 lb. 2 oz.
Least	6. 5	6. 5	1. 1	4 oz.
Median	8. 0	7. 0	1. 2	6 oz.

Large Flake Tools

Three were collected. Of these, two are large simple flakes. One, a questionable tool (BN–3/191; pl. 18, *a*, 19), has four, at least partly natural teeth or projections at one end. It is actually a lengthwise fragment of an eroded cobble; it would have made an excellent scoring or macerating tool.

Material: 2 quartzite, 1 basalt.
Average size: Length 8.0 cm., width 7.0 cm., thickness 1.5 cm.
Weight: 5 oz.

Circular Pebble Scraper

One small cobble, rounded by chipping, was found. This scraper or small chopper might well be bracketed with the "chopper" category. (BN–3/99, pl. 18, *a*, 6).

Material: Fine basalt.
Size: Diameter 7.2 cm., thickness 1.3 cm.

This should be compared with the artifacts illustrated by Smith (1910, p. 70) and Strong et al. (1930, pl. 19).

Rectangular Chipped Cobble Net Sinkers

Two rectangular chipped cobble net sinkers were found; one is broken but the pieces are in every respect similar to those described above for BN–53.

Size range	*Length (cm.)*	*Width (cm.)*	*Thickness (cm.)*	*Weight (oz.)*
Greatest	8. 5	6. 5	1. 6	5
Least	7. 0	5. 5	1. 0	3

Two-Notched Sinkers

Forty-four two-notched net sinkers were taken from site 45–BN–3 (BN–3/722 (23); pl. 18, *a*, 26; BN 3/3, *a*, 28; BN–3/180, *a*, 29; BN–3/B5/177, *a*, 30, and BN–3/1 (11), *a*, 32). They are wholly typical; all are flat, usually slightly elongate cobbles with notches formed on each end by the removal of a few flakes. One flake from each side at each end, four blows, was sufficient for the simplest and best of these. It is likely that it was the work of only a few moments for an Indian to make enough sinkers for his net.

Material: The various igneous cobbles brought down the Columbia from the Rocky Mountains, and varicolored quartzites, were preferred materials. Igneous cobbles of andesite, basalts, etc. and their porphyrys were in the majority here as in most categories (the large quartzite flakes are an obvious exception) just as they are in a majority on the shingle beaches of the Columbia. There is probably a direct connection between these two facts and the available range of choice was doubtless a strong governor of final preferences of material (Osborne, in Kluckhohn and Reiter, 1939, p. 56).

Size range	*Length (cm.)*	*Width (cm.)*	*Thickness (cm.)*	*Weight (oz.)*
Greatest	10. 5	7. 5	2. 3	10
Least	5. 0	4. 5	1. 0	2
Median	7. 5	7. 0	1. 5	4. 5

There are a few, only four, variants in this large series. Three rather large sinkers were shaped either before or after notching. Presumably, this was to remove projections (pl. 18, *a*, 28) and reduce the sinker to a smooth round or smooth oval. Such a shape, the usual one, would be less apt to entangle on the uneven bottom of the Columbia. In addition to the above variants, one small quartzite flake, of the type described, had been blunted and notched.

Four-Notched Sinkers

Only seven four-notched sinkers were found (BN–3/3, pl. 18, *a*, 27; BN–3/193, pl. 18, *a*, 31). The notches are on the four sides, 90 degrees apart, of roughly circular, flat cobbles. They are in every respect, even to further shaping, similar to the two-notched except that they were attached in a different manner. Whether they were used as the two-notched were employed or served some special purpose such as end sinkers on the net or were made as a matter of individual preference is unknown.

Material: Igneous, mostly andesite.

Size range	*Length (cm.)*	*Width (cm.)*	*Thickness (cm.)*	*Weight (oz.)*
Greatest	10. 1	9. 2	2. 3	12
Least	4. 6	5. 9	1. 0	1
Median	8. 8	8. 0	1. 5	7

To summarize a few points of interest: the rectangular net sinkers (?), probably used with a frame and lashing, were far more typical of BN–53 than of BN–3. The opposite is true of notched sinkers. The possible significance of this has been suggested; if the collections are true samples, there can be no doubt that a chronological or cultural difference is reflected here. There was an extensive use of the crude tools and an extensive amount of material available (river cobbles of hard igneous rock) for making them.

Although a quantitative discussion is not given, it would appear that Krieger's (1928 b, pl. 4) complex of crude utility stone tools is either similar to or identical with that of BN–3. The range of notched sinkers has not been studied closely but the distribution extends at least from north central California north to southern Alaska and east to Idaho (Strong et al., 1930, pl. 18, and Smith, 1910, fig. 13).

GROUND AND ABRADED STONE

This category, for convenience of discussion, includes such diverse items as metates and stone pipes. Both were formed by grinding, abrading or pecking, polishing, incising or cutting, or such techniques as are basically dependent upon the wear of stone upon stone to obtain the desired results.

45–BN–53

First to be discussed are the coarser and heavy objects. They include eight unfinished, fragmentary, or very crude pestles; a mallet or maul which is a slightly altered natural cobble of peculiar shape (45–BN–53/2, pl. 18, *b*, 7); a typical, though crude, short pestle with a medial groove (pl. 18, *b*, 11); and two rounded quartzite cobbles, probably large net or trap sinkers, with pecked medial three-quarter grooves (pl. 18, *b*, 9, 10). All of the pestles are diorite porphyry and basalt with the exception of plate 18, *b*, 5, which is banded quartzite. Weight of the crude pestles runs from 2 to 4 pounds—one large unfinished pestle of diorite porphyry weighs 15 pounds 2 ounces (BN–53/1, pl. 18, *b*, 6). The quartzite ¾-grooved sinkers weigh 4 and 5 pounds. All of the above are surface finds.

Pestles

Most of the pestles found on the surface were broken, presumably because collectors had removed the whole specimens. The shorter ones are in two instances part of a small column of columnar basalt (BN–53/1(2), pl. 18, *b*, 8). Length of the shorter pestles (BN–53/1(5), pl. 18, *b*, 4) varies around 15 to 16 cm., the diameter 5 to 7 cm.; the weights have been mentioned. The fragments of broken larger pestles (BN–53/1(7), pl. 18, *b*, 5), of which there are four, are of about the same length. They vary between 7 to 9 cm. in diameter and weigh 3 to 4½ pounds.

Grooved Sinkers

The large ¾-grooved quartzite cobbles are indubitably heavy sinkers (BN–53/15, pl. 18, *b*, 9 and 10). While they are of a proper shape and size for hafted mauls or hammerstones, they show no identifying wear that would indicate such use. Strong et al. (1930, pl. 25, *b*) and Smith (1910, figs. 14 and 15) show this type of grooved sinker. The short pestle with full central groove (BN–53/1(4), pl. 18, *b*, 11, groove at top of number tab, length 18.5 cm., diameter 6.5 cm., weight 2 lb. 3 oz.) suggests that the use of hafting was known. Ray (1942, p. 146) lists hafted hammers for the Umatilla.

Grinding Slabs

Grinding slabs or hopper mortar bases were not rare. Eight fragments or whole pieces were found. Of these, five were brought back from the field.

There are two definite types: the first is simply a large pebble with one flat surface. Type I (BN–53/54, pl. 18, *b*, 3; andesite) was found at a depth of 2 feet in the midden test. Its measurements are: length, 22.5 cm.; width, 16 cm.; thickness, 7 cm.; weight, 9 pounds 8 ounces. The area showing use is 12 cm. by 9 cm. The second type, of which all examples are basalt, is primarily a flat slab with a pecked or worn depression. It is obvious that this type would be more apt to contain the material in its larger and deeper depression than the flat-cobble type first described. Type I must have been used over a stretched hide to catch the particles while the second need not have been. Type I must have been more generally employed for pounding roots and flesh while the second type would have been far more efficient in the grinding of seeds. The two whole specimens of type 2 were found inverted at hearth or occupational levels in houses 49 (BN–53/HP 49/55, pl. 18, *b*, 2; length 21 cm., width 18 cm., thickness 7 cm., weight 8 pounds 12 ounces, the concave grinding surface covers most of the slab) and in house pit 42 (BN–53/HP 42/69, pl. 18, *b*, 1; length 36 cm., width 29 cm., thickness 7.5 cm., weight 23 pounds 15 ounces. The grinding surface is exceedingly shallow and covers most of the surface). No mullers or manos were found. It is probable that pestles and basket hoppers were used. The remaining slabs examined at the site or collected were all fragments of type II slabs. All were surface finds.

Mallet Pestles or Hand Mauls

The crude mallet 45–BN–53/2 (pl. 18, *b*, 7, see discussion under BN–3, p. 63) is a slightly altered natural diorite porphyry cobble. The handle and body were already present, and the former was shaped by pecking along the edges. The object is 21.3 cm. long; the body diameters are 10.3 by 4.4 cm. It weighs 5 pounds 8 ounces. Slight scars on the bottom indicate some use as a pestle and those on the side of the body show use as a mallet.

One small, more thoroughly worked, diorite porphyry mallet (BN–53/3, pl. 19, *a*, 11) appears to have seen as much use as a pestle as a mallet or maul. The short handle is tapering, the expanded body oval in outline. The artifact, a surface find, is 12.4 cm. long, the greatest diameter of the body is 6.5 cm., the weight is 1 pound 13 ounces. Drucker's (1943, p. 49) types IA and IBI were present at the two sites.

Arrowshaft Polisher

One arrowshaft polisher or smoother is made of a green diorite porphyry pebble. The pebble is 10.1 cm. long, 8.7 wide, 4.0 thick, and weighs 1 pound 12 ounces. The groove is partly destroyed by the removal of a chip, but was at least 1.5 cm. wide by 7 mm. deep. It shows a good deal of wear. If this artifact were used for shaft smoothing, it functioned probably more as a final smoother than as a rough tool for preliminary shaping (BN–53/16, pl. 19, *a*, 9). There is no evidence that the object was heated for use as a straightener. Such treatment might not, however, leave its mark on the dark diorite.

One fragment of the typical sandstone (see below under 45–BN–3) shaft smoother was found in house pit 42. It does not merit a separate description.

Basalt File

A file or whetstone was the most interesting ground stone artifact from the BN–53 excavations (–53/HP 52?/22; pl. 19, *b*, 2). It lay deep in the fill between house pits 52 and 49 and was consequently thrown from the upper parts of one of these pits. This type of artifact, often called a whetstone, may be more properly called a file and will be so designated here. This example is shaped like a T with the crossbar heavy, thick and beveled on both sides toward the top. The upright is almost vestigial. It probably served as a grip or aid in holding the file. This piece has green bits included in the vesicles on one side. At first they were thought to be copper. Tests in the laboratory demonstrated that the basalt files will cut the copper sheeting found at 45–BN–3 rapidly. However, the green flecks were analyzed by B. H. McLeod and were found not to be copper. This reinforces the placement of the 45–BN–53 house pits excavated as precontact. These tools will also cut the serpentine and chalcedony of the celts and, of course, work the soft chlorite schist pipes rapidly. It is surprising that more files were not found. This specimen is 6.9 cm. long, 3.2 cm. wide, and 7 mm. thick. It weighs one-half ounce. Two more similar objects (pl. 19, *b*, 3 and 4) will be discussed under 45–BN–3.

45–BN–3

Only three heavy and/or crude artifacts were collected at 45–BN–3. One more, a large grinding slab or mortar base, was found but was left at the site. The fact that heavy, fragmentary pestles or unfinished pestles, heavy sinkers, etc., were rarer at BN–3 than at BN–53 may possibly be a reflection of the size of the site rather than of cultural difference, but the excavators think that this was one of the aspects of the meager BN–53 artifact series that tend to suggest that BN–53 was an earlier dwelling site in contrast to the camping-burial site BN–3.

One broken pestle-shaped artifact of columnar basalt, similar to the one from BN–53, was found (BN–3/688, length 17 cm., striking face 7.5 by 5.3 cm., weight 2 pounds 3 ounces., 4-sided small basaltic column). It is crudely shaped. The sharp sides of the column have been reduced by pecking. One heavy conical cobble of granite, used as a short pestle or hammerstone, is 17.2 cm. long, with a striking face 9 cm. by 8 cm. It weighs 4 pounds. The only shaping was through use.

Large Sinkers

This site yielded one of the large ¾-grooved rounded cobble sinkers. This one is 14 cm. long, 11.5 cm. wide along the groove, and 7 cm. thick. It weighs 4 pounds 8 ounces and is of andesite. Girdled sinkers, apparently of this type, are illustrated by Collier et al. (1942, pl. 17, *j*).

Grinding Slabs

The type II grinding slab or mortar base, feature 2 of 45–BN–3, was an irregular piece of heavy basalt 15 cm. thick. It was almost 30 cm. in diameter. The circular worn area in the center was deepened only slightly and was 15 cm. in diameter.

Basalt Files or Whetstones

Files or whetstones were surprisingly rare at BN–3 when one considers the number of ground stone objects that must have required their use. Four were found, three with burials (BN–3/B 36/613, pl. 19, *b*, 4; /B24/531, pl. 19, *b*, 3; and B53/783). The latter has a long slender blade shape. The fourth, B53/802, was a surface find. All are of scorious, gritty vesicular basalt, and are roughtly triangular in shape with blunted backs and double-beveled sharper edges. As mentioned under BN–53 these are remarkably efficient cutting or abrading tools. They probably saw use as files, saws, rasps, etc. Specimen 531 is 7.7 cm. long and 3.6 cm. wide at the base by 8 mm. thick; specimen 613 is 8.5 cm. long, 5.9 cm. at the base and 1 cm. thick, it weighs 1¾ ounces. Strong et al. (1930, pl. 20, *a* and *c*) illustrate two files of which the second is similar to ours.

Stone Spoon

One chlorite schist (soapstone or steatite) spoon was found. It (45–BN–3/B 25/514, pl. 19, *b*, 7) lay at the right side of the upper body of burial 25. At present it holds about one tablespoonful, but the front rim is worn or broken and it probably held nearly twice that amount when new. On the bottom a sharply incised line runs below the rim at a distance of 4 mm. from it. Short incisions slant from this line to the rim every 3 or 4 mm. The handle is broad (3 cm.) and short (1.2 cm.) and is ticked both top and bottom with short slanting parallel incisions. The total length is 7 cm., the bowl length is 5.5 cm., and the width is 6 cm.; the weight is 1 ounce. The thickness varies from 7 mm. (handle) to 3 mm. (bowl rim). The object is attractive and smoothly finished.

Stone Pendant

Only one was found (–B41/597, pl. 19, *b*, 11). It is small, irregular in shape (length 1.8 cm., width 1.1 cm., and thickness 1.5 mm.), made of green evenly colored serpentine. A small, double conical hole pierces the top and there is evidence of a previous drilled hole, now partly broken away, above the present one.

Tubular Pipes

Five whole tubular pipes were found, together with the fragments of two more. All are of soft soapstone or chlorite schist. For purposes of comparison I have divided them into two types: the cigar shaped and the trumpet shaped. None of the unusual two-piece (stem fits into the bowl) steatite pipes of the Columbia area were found during the 1948 excavation.

Cigar shaped.—The tubes, in the first three to be described, are long and only slightly expanding centrally. The mouthpiece is a disklike expansion ornamented in two instances (–B36/607 and /272, pl. 19, *b*, 9 and 13) with small incised ticks around the rim 5 mm. and 2 mm. apart, respectively. The former does not have a hole for suspension drilled through this rim, although there are six nicks around the distal side of the rim which may have been intended as the beginning of further drilled decoration; the latter does have a hole for suspension. Specimen 607 has a generally unfinished appearance. There are longitudinal grooves, caused by filing, that were not ground smooth. A third pipe of this same type (B25/515, pl. 19, *b*, 14) is ornamented with a series of drilled depressions connected by a line on the distal face of the mouthpiece disk. It has been drilled for suspension. One broken and one unfinished hole attest to previous attempts at such drilling. A variant of this type (B 24/532, pl. 19, *b*, 8) is a short, squat, tubular pipe in every way similar except for its altered proportions and the lack of decoration on the mouthpiece. (This type is called a "squaw pipe" by local collectors.) The mouthpiece is not drilled for suspension.

This pipe and specimen 607 have holes in the sides of the barrels. At first this was taken as evidence of killing but closer examination disproves this. Both show evidence of repair. Specimen 607 has a small hole (5 mm. in diameter) on the lower barrel. It was broken in from the exterior, probably by dropping. A faint lighter ring around the pipe at this point indicates a binding which was certainly a repair of the hole. Probably a plug was bound in. As far as one can tell from the exterior, specimen 532 had been similarly broken in two places. The larger hole shows no indications of repair that I am able to detect, but the smaller has a bit of rusted iron (now largely limonite) which has preserved the impressions of wooden bits. This passes within the hole. It is not possible to work out the method of repair or, indeed, to state that this is actually repair and not a fortuitous juxtoposition within the grave. It is probable, however, that the small pipe was broken, but repaired and used.

In the interior of these pipes a drilled, usually slightly conical, hole leads in from the mouthpiece end to about one-third of the total length of the pipe. Here there is an abrupt expansion of the bowl part of the barrel. This appears to have been formed partly by drilling and finally by gouging with a chisel. Both circumferential and longitudinal groovings are visible within the pipes.

The two fragments were also parts of this cigar-shaped type of pipe. One is a mouthpiece disk, tick decorated and drilled (B36/619, pl. 19, *b*, 15). It has been smoothed and apparently used as a pendant. Another is a bowl fragment (B12–14/367, pl. 19, *b*, 12). It preserves part of the distal lip of the bowl and shows longitudinal gouge or chisel grooves. It is 2 to 3 mm. thick—probably an average for the larger pipes of its type. The smaller are certainly less thick.

Trumpet shaped.—With this type the bowl and mouthpiece are in form a large and small cone placed small end to small end (BN–3/B 36/628, pl. 19, *b*, 10). On this specimen a raised ring is carved at this junction. The pipe was carved from a single piece of fine chlorite schist. It is translucent and the walls of the bowl are so thin that, when smoked, the red coal can be seen gleaming through. Eight triangles with their bases at the bowl and apices pointing stemward are the sole incised decoration. They are crossed with five to eight small incised lines. Altogether this is a most attractive artifact. A variation of this type, not found at BN–3, is shaped much like a wineglass. Sometimes this type has, but more often it lacks, a disk mouthpiece. Table 7 gives the pertinent measurements of the pipes.

The first and last of the above pipes are relatively poorly finished. The other three are a smooth and glossy black. There is manifest in the table a surprising lack of variation in all measurements except the length. One might almost think that there was a rather close norm in this respect—or that the pipes in the collection were made by one person. The measurements given by Strong et al. (1930) are all for the trumpet-shaped pipes. After a larger series of pipes has

Table 7.—*Pipe measurements*

Artifact No.	Length (cm.)	Bowl diameter (cm.)	Greatest diameter (cm.)	Across mouth-piece	Stemhole	Material
B36/607	17.7	1.7	2.3	2.5	0.9	Steatite.
B25/515	9.8	1.8	2.4	2.0	1.2	Do.
/272	12.4	1.8	2.1	2.6×2.2	1.2	Do.
B36/628	[1] 6.2	1.9	2.1	1.3	.9	Do.
B24/532	4.0	1.5	2.2	1.7	1.0	Do.

[1] No. 628: bowl length, 4.0 cm; stem length, 2.2 cm.

become available, we should be able to state the preferred forms.

Pipes of both of the above types appear throughout the Plateau. Krieger (1927, p. 198, fig. 196) illustrates them from the Upper Columbia and Smith (1910, pp. 106, 107) does also. Smith shows the second type from Kamloops (1900, p. 429, fig. 347) and Collier et al. (1942 pl. 14) found both types on the Upper Columbia. Spinden (1908, pl. 9, 4, 5) illustrates trumpet shapes from the Nez Percé area; Smith (1899 a, pp. 154 and 156) also illustrates both types from Lytton.

Celts

Six celts are in the collection from 45–BN–3. Two are fragmentary, one is broken in two parts (both of which were found), and two may have been broken but were used in their present condition. Table 8 gives the measurements of the four probably whole celts. The two fragmentary ones were similar to B25/517 and B7(?)/235–267.

These artifacts are all of a single type, type I, except No. 517 which is a variant. It lacks a pointed poll but this, as is indicated, appears to be broken. Its greatest claim to individuality is the single-beveled blade; therefore, it is designated as "type I a." This may indicate an adzlike use. Apparently a single-beveled edge was usual in the north. Collier et al. (1942, p. 41) have a short discussion of it. Drucker's (1943, p. 47) types IA and IC are present here. Three of the celts described in the table are illustrated in plate 19, *b*: B5/174, 1; B7(?)/235–267, 6; and B25/517, 5. The largest celt found, No. 778, has a longer parallel-sided blade. It has a double bevel, but one bevel is much weaker than the other.

Table 8.—*Celt measurements*

Artifact No.	Blade length (cm.)	Blade width (cm.)	Thickness (cm.)	Poll	Bevel	Material	Weight (oz.)
B5/174	9.0	4.0	1.4	Pointed	Double	Dark chalcedony.	4
B7?/235–267	4.9	3.6	.6	do	do	Serpentine	1
B25/517	7.0	4.7	.9	Broken?	Single	do	3
B53/778	13.1	6.0	1.8	Battered	Assymetric double.	do	12.5

The edges of these celts are neatly chamfered (No. 517) or rounded, and two (Nos. 517 and 778) show remnants of the groove formed in cutting out the original blank.

Stone Beads

Only five stone beads, representing three types, were found. All are of steatite. The first type includes three (B25/464, pls. 19, *b*, 16, and 12, *b*, 31). They are flat and roughly circular. The largest bead is 1.3 cm. in average diameter, while the two smaller are 1.1 cm. Thickness is about 1 mm., the biconically drilled central perforations vary around 1.5 mm. Small incised ticks 2 to 4 mm. apart ornament the rims. A line of wear may be observed on one side of all three beads. This extends across the perforation. These lines of wear indicate that the beads were worn sewn flat, like sequins, to some article of apparel. It is possible to suggest a number of techniques for this.

Another small steatite bead (BN–3/727, pl. 19, *b*, 17) was found in the same level with numerous glass beads of varied types. It is a nondescript roughly spherical bead. The measurements are 4 mm. diameter; 6 mm. thickness; perforation, 3.5 mm.; it is biconically and evenly drilled. The fifth, B53(?)/791, is a large stone ball 5.7 cm. in diameter, 4.0 cm. wide. The double drilled hole has been gouged inside and the drillings are of a different bore (1.7 and 1.3 cm.). Erratic incised lines decorate the otherwise polished exterior. The piece weighs 7 ounces. It may have been started as a pipe.

Arrowshaft Smoothers and Polishers

Six pairs of these smoothers of coarse gritty stone, plus one small fragment, were found. In addition, a single grooved polisher or straightener to be used with heat (No. 357, pl. 19, *a*, 10), decidedly a variant, was found. It is of fine, black basalt and was not used with a paired similar artifact, as were the others. The groove has been used extensively and is very smooth. Details of this object as well as the others will be found in table 9. Spinden (1908, pl. 7, 34) shows a type of artifact which may well have had the same use as this polisher.

The six pairs of smoothers vary somewhat in size, details of form, etc., but all are of the same type. The pair B49/678–684 (pl. 19, *a*, 7 and 8) is poorly made and has apparently seen extensive use. The groove is so broad and shallow (No. 7) that one might surmise that it was used in only preliminary smoothing operations. It is, of course, possible that this difference reflects individual preference. The two pairs (B39/585–640, pl. 19, *a*, 12 and 13, and B41/595–596, pl. 19, *a*, 3 and 4) made of volcanic tuff (with ca. 80 percent glass) are a variant

TABLE 9.—*Arrowshaft smoothers, 45–BN–3*

Specimen No.	Plate No.	Length (cm.)	Width (cm.)	Thickness (cm.)	Groove		Material and weight (oz.)	Remarks
					Width (mm.)	Depth (mm.)		
B39/585	19, *a*, 12	19.8	3.9	3.0	5.7	2.5	Volcanic tuff; 12	Diagonal groove; curved bottom; paired with /640.
B39/640	19, *a*, 13	19.7	3.8	3.0	7.0	2.5	Volcanic tuff; 13	See above.
B8 ?/239–240		20.8	4.5	3.5	6.0	3.0	Coarse sandstone; 17	Central groove; paired with /294.
B8 ?/294		20.6	4.5	3.0	5.0	2.0	Coarse sandstone; 16	See above.
B11 ?/270		13.3	3.0	2.5	9.0	5.5	Coarse sandstone; 8	Central groove; paired with /271.
B11 ?/271		13.2	3.5	2.0	8.0	3.0	Coarse sandstone; 7.5	See above.
B49/678	19, *a*, 7	11.7	4.3	2.5	13.0	2.0	Coarse sandstone; 6	Crude; rounded bottom and sides; broad flat groove; paired with 684.
B49/684	19, *a*, 8	12.5	4.2	2.7	14.0	2.0	Coarse sandstone; 8	See above.
/357	19, *a*, 10	8.0	4.0 2.5	4.0	13.0	4.0	Fine basalt; 6	Polisher; not paired.
B41/595	19, *a*, 3; 15, *a*	14.5	2.5	1.8	8.0	3.5	Volcanic tuff; 3	Diagonal groove; partial groove on side; paired with /596.
B41/596	19, *a*, 4; 15, *a*	14.8	2.9	2.2	6.0	3.0	Volcanic tuff; 4	See above.
B53/776–777		16.0	3.7	2.0	8.5	5.0	Coarse sandstone; 6	Diagonal groove; paired with 784 ?
B53/784		(1)	3.6	2.6	6.0	1.7	do	See above.
B53/786		(1)	3.8	2.2	8.5	2.0	do	Not paired ?; central groove; partly double.
B53/789		(1)	(1)	(1)	(1)	(1)	Coarse sandstone	Central groove; partly double.

---

[1] Broken.

type or subtype. The difference in material is not as important as that of the placement of the grooves. In both pairs that are made of the tuff these channels run from corner to corner, or approximately so. It should be noted, in passing, that Smith (1899 a, p. 146, fig. 57) illustrates what may be diagonal-grooved smoothers.

The other arrowshaft smoothers are of very coarse sandstone with angular grains. They are extremely abrasive, at least as much so as our No. 2 (very coarse) sandpaper. There are 1 large and 2 small pairs. The grooves are centrally placed. All of the large smoothers with the single exception of B53/776–777, which had diagonal grooves, were broken, probably killed, and one of the smaller (595–596) was also broken. Each unit of 640–575 was broken into three pieces; all others were only halved. The fragments of this pair were scattered, but those of 595–596 were neatly arranged by burial 41 as can be seen in plate 15, *a*. An examination of the burial record will reveal the position of all artifacts. Smoothers of the type described are widespread throughout North America. Collier et al. (1942, pl. 14) illustrate almost exact counterparts of some of my pieces. The same may be said for that illustrated in Spinden (1908, pl. 7, 32).

This series is too short to validate a continuing discussion of these smoothers as tools and as examples of different traditions in a rather sensitive phase of the craft of arrowmaking. They do, however, present interesting problems: (1) that of the diagonal grooves, (2) of the large versus small pairs, (3) the different sizes of the grooves, (4) the single smoother, (5) the different materials. In concluding the description it should be emphatically stated that in none of these pairs do the grooves, when the two stones are placed face to face and the channels in juxtaposition, form a circular opening. Stated otherwise, none of the grooves are semicircular in cross section; all are somewhat less. Thus, the grooved faces of the stones, when in operation grinding down a shaft, did not come into complete contact. It is difficult to see how the diagonal grooved smoothers were handled when in use. When the grooved faces are together and the channels opposite, the long axes of the stones are not parallel. The diagonal grooves are not true. It is possible that worn areas may give a clue. One of a pair (No. 585, pl. 19, *a*, 13) has a slight depression parallel to the groove worn for about one-half the length of the piece from one end. The other of the same pair (No. 640) has one side worn down for about one-half the length of the stone. When the worn side of No. 640 is placed in the shallow depression of No. 585 and the pieces are tipped away from one another so that the faces are separated by an angle of from 12° to 15° the grooves come into round; i. e., form segments of one circle. This is probably the manner in which the tools were used.

Pestles

Eight pestles of various sizes were cataloged from 45–BN–3. Table 10 gives pertinent data on them. There are actually four sizes with a pair of pestles in each size. Two of the pestles do not have rounded or pointed tips, but the tapered end is truncated squarely (B4/91, pl. 20, *b*, 3). Three (B7/232, pl. 8, *b*, 30; B37/620; B48/656, pl. 20, *b*, 4, and 17, *a*, 1) show only enough pecking to give them a proper pestle shape. They still retain partly or in large measure the natural surface of the elongate quartzite cobbles. The remainder are worked over the whole surface. All but one (B32/573, pl. 20, *b*, 1) have flattened striking faces (bottom). This pestle apparently was not used sufficiently to acquire this or functioned with a different type of mortar. It does have, however, a small scarred area on the bottom, barely 2 cm. in diameter, which is flattened.

The two longest pestles, of which No. 573 is one, have been broken into three pieces, and two others of the moderately long pestles have been broken into two pieces. This is no doubt a killing of the artifact (see remarks anent this under burial 32). No scars show where or what type of blow was used in breaking the pestles. All of the finer implements, the largest four and the smallest, show a smoothing of the upper third which may be the result of use. These finer and better finished artifacts are basalt or diorite porphyry (B44/643, pl. 20, *b*, 2, and B4/91, 3). Wear is, of course, apparent on the bottom. Short heavy pestles of the type of B43/663, plate 20, *b*, 5, often appear to have seen rougher usage than the longer, more attractive artifacts. Spinden shows both types for the Nez Percé (1908, pl. 8, 6, 8) as does Cline et al. for the Okanogan (1938, p. 59. fig. 25).

Mortars

No mortars of any type were found. Wood or rawhide mortars (see Ray, 1939) were no doubt the types used. The pestle may have been used with basket hopper affixed to the slabs.

Mallet Pestles or Hand Mauls

These objects are apparently primarily peculiar to the Northwestern United States and adjacent Canada. As yet the limits of distribution are unknown. These peculiar stone hammers are called mauls, hand mauls, and pestles (Smith, 1910, p. 44) and hammers (Smith, 1899a, p. 138). As far as I am concerned, none of these terms is wholly applicable or wholly correct—as consultation with a dictionary will indicate. On the other hand, these tools are almost an exact counterpart, in stone, of our sculptor's mallets. Like them they were apparently usually single-handed implements. Lewis and Clark (Coues,

TABLE 10.—*Tapered pestles and mallet pestles, 45–BN–3*

TAPERED PESTLES

Specimen No.	Plate No.	Length (cm.)	Greatest diameter (cm.)	Striking face diameter (cm.)	Material	Weight	Remarks
B39/641	14, *b*, 23	37.3	5.7	5.5×4.4	Basalt	5 lb. 8 oz	Broken in 3 pieces.
B32/573		38.5	7.4	Rounded	Fine basalt	6 lb. 14 oz	Probably little used; broken in 2 pieces.
B44/643	20, *b*, 2	31.0	6.1	4.5×3.5	Diorite	4 lb. 3 oz	3 pieces.
B4?/91	20, *b*, 3	26.5	6.5	5.5×4.5	Diorite porphyry	4 lb. 10 oz	Whole; tapered end truncated.
B7/232	8 *b*, 30	24.5	6.5	3.7×3.5	Quartzite	3 lb	2 pieces; roughly finished.
B37/602	20, *b*, 4	21.0	6.2	5.0×4.5	do.	2 lb. 14 oz	Whole.
B48/656	17, *a*, 1	19.0	5.5×4.0	2.6×2.0	do.	1 lb. 8 oz	Whole; a cobble only slightly altered.
B43/663	20, *b*, 5	17.5	5.2	5.0×3.5	Diorite porphyry	2 lb	Whole; tip truncated.

MALLET PESTLES

Specimen No.	Total length (cm.)	Body			Handle			Tip		Material, weight; remarks, plate No.
		Length	Diameter at bottom	Diameter at top	Length	Maximum diameter	Minimum diameter	Base	Top	
B12–14/307	22.0	9.3	8.5×7.5	8.9×9.9	14.5	7.8	4.1	3.0	1.6	Andesite porphyry; 3 lb. 4 oz.; unbroken; 2 flattened striking areas on opposite sides of body; diameter of top ring, 4.8 cm. (pl. 21, *a*, 1).
B8/254	23.6	9.0	8.2×7.0	9.3×9.4	14.6	8.9	4.6	2.7	1.5	Diorite porphyry; 6 lb. 3 oz.; has 2-ringed tip; diameter of lower 5.4 cm.; channel between the 2, 4.8 cm.; broken in 2 pieces; practically unused (pl. 21, *a*, 2).
B45/642	23.4	10.5	6.1×6.0	9.9×8.8	13.0	7.0	5.2	4.8	3.8	Diorite porphyry; 6 lb. 8 oz.; low, heavy tip; diameter of ring below tip 5.7 cm.; broken in 2 pieces; body of original stone triangular; pecked (pl. 21, *a*, 3).
B45/774	24.9	10.2	10.0	9.0	14.7	6.7	4.8	8.0	2.0	Same tip as /307.

1893, vol. 2, p. 640) give a description of their use. There is some indication that the artifacts saw as much use as pestles as they did as mallets. A larger series should be examined before the problem can be settled, but they, for the above reasons, will be called mallet pestles in this report.

Four of these artifacts were found at BN–3; pertinent data on them will be found in table 10. All but one were mortuary furnishings. Two (B12–14/254, pl. 21, *a*, 2, and B45/642, pl. 21, *a*, 3) are broken through the handles, presumably they were killed ceremonially. One, B12/307 (pl. 21, *a*, 1), unbroken, appears to show evidence of a good deal of battering on opposite sides of the body. Specimen 254 probably saw little use before being placed in the grave. The bottom shows a circular, smoothed area which may mean some use as a pestle. The sides of the body and handle show fresh pecking and scoring of basalt or sand filing. No. 642, also broken, was made by pecking down two sides of a triangular cobble and pecking or grinding out of the handle. It shows little use of the sides of the body but some of the bottom. The handles all taper down from the body, then expand slightly and are surmounted by a tip or nipple. One specimen, No. 254, has a double ring below the tip.

Smith (1899 b, passim) gives a description of these artifacts and a discussion of their range of form. It would take extensive work to add much to the general aspects of his short paper. Spinden (1908, pls. 6 and 8, 10) illustrates mallets that are identical even as to handle tips, with those from BN–3. The pestles that he illustrates on the same plate would also be typical of that site. Krieger's (1928 b, pl. 1) mallets are all noticeably cruder in outline and finish than those from BN–3.

Carved or Incised Slate Effigies

In the first reports these pieces were described as "Guardian spirit effigies" largely on the basis of the following quotation from Teit (1930, pp. 194–195):

> Men formerly carved images of their guardian spirits. These were generally stone figures of animals, birds or parts of them. Usually they were small and kept in the medicine bag. . . . Most were of human form. . . .
>
> Some stone images did not resemble any known animals, because they were representations of beings or parts of beings seen in dreams. . . . These stone images were regarded with considerable reverence . . . were never bought or sold . . . In fact, they were seldom or never handled except by the owner, and when he died they were placed in his grave or deposited near by.

Fortunately Drs. Verne F. Ray and William Elmendorf read the report, in its thesis form. Both men pointed out the undesirable aspects of the use of a specific designation of this type with so little or no firm foundation. Ray's comments are pertinent, and I am quoting them with his permission:

> . . . I do not suggest that you change your phraseology because these are interpretations which we cannot check objectively and my inability to accept them is frankly subjective. But my feeling is that the terms fit the cultural patterns of Teit, Smith, Osborne, and Ray much better than they do the Plateau Indians as I know them.

This comment throws into relief one of the major pitfalls that beset the archeologist who would make as many and close ethnographic interpretations as possible. Great caution must be exercised and interpretations of materials or data from excavations must not be allowed to rest upon ethnographic hearsay. If the archeologist is unable to go into the field ethnographically (in an area not fully documented), he should discuss matters with ethnographic specialists or forego interpretative statements which might well start his own or others' work in a wrong direction. Truly, mention should be made of all possible ethnographic interpretations known or discoverable to and by the archeologist. This must be done, however, with no taint of certainty.

With the sole exception of /553, all of the carvings were of a single type, as can be seen in the tabulated information (table 11). None

TABLE 11.—*Carved slate effigies, 45–BN–3*

Artifact No.	Length (cm.)	Width	Thickness	Material	Remarks	Design
B12?/301 (pl. 20, *a*, 22).	11.8	4.8	1.0	Clay, calcareous unbaked.	Weight 3 oz	Fig. 2, *a*.
B48/675 (pls. 17, *a*, 6; 20, *a*, 6).	9.3	3.6	.6	Slate	Red ocher stain in incisions.	Fig. 2, *b*.
B39/587 (pls. 14, *b*, 16; 20, *a*, 20).	9.4	3.5	.6	do		Fig. 2, *c*.
B39/580	9.2	3.5	.6	do	Red ocher over whole design side.	Fig. 2, *d*.
B26/497 (pls. 15, *b*, 13; 20, *a*, 26).	9.2	3.1	.7	do	Weight 1.25 oz	Fig. 2, *e*.
B48/634	8.4	3.5	.7	do	Weight 1.25 oz.; red ocher in incisions.	Fig. 2, *f*.
B48/653(13)	8.1	3.3	.5	do		Fig. 2, *g*.
B39/567	7.5	3.3	.3	do	Red ocher covers both sides, more on incised side.	Fig. 2, *h*.
B39/592 (pl. 20, *a*, 17).	7.0	2.0	.2	do	Red ocher at incised end	Fig. 2, *i*.
B39/588	6.7	2.7	.6	do	Red ocher at carved end, both sides.	Fig. 2, *j*.
B48/655 (pl. 20, *a*, 7).	6.2	2.4	.6	do	Weight 0.5 oz	Fig. 2, *k*.
B26/504 (pl. 26, *a*, 23).	5.2	1.7	.3	do		Fig. 2, *l*.
B39/566 (pl. 20, *a*, 16).	3.9	1.2	.2	do	Red ocher in incisions	Fig. 2, *m*.
B26/553 (pl. 20, *a*, 25).	9.6	2.0 top; 0.6 foot.	.5	do	Sawing groove shows both sides; red ocher on front; light red on rear.	Fig. 2, *n*.
B48/653(15)	9.0	3.6	.5	do	Blank for carving, no incisions, unsmoothed.	
B48/653(16)	7.7	3.1	.4	do	As above (15)	
B48/653(17)	7.6	3.8		do	As above (15 and 16), unworked.	

was found isolated in the midden; all were with four burials. Plate 20, *a*, 5, 6, 7, 16, 17, 18, 19, 20, 22, 23, 24, 25, and 26, illustrates them.

Burial 12 had only one (/301, pl. 20, *a*, 22), a larger piece made of highly calcareous sunbaked clay. The untempered clay is heavy, fine, and dense; it has checked somewhat in drying around the edges and within the worked area. Faint striations indicate that the artifact was wiped while the surface was damp after the incised design was made. This incising appears to have been done with a rather blunt tool; the bottoms of the grooves are rounded. Indications are

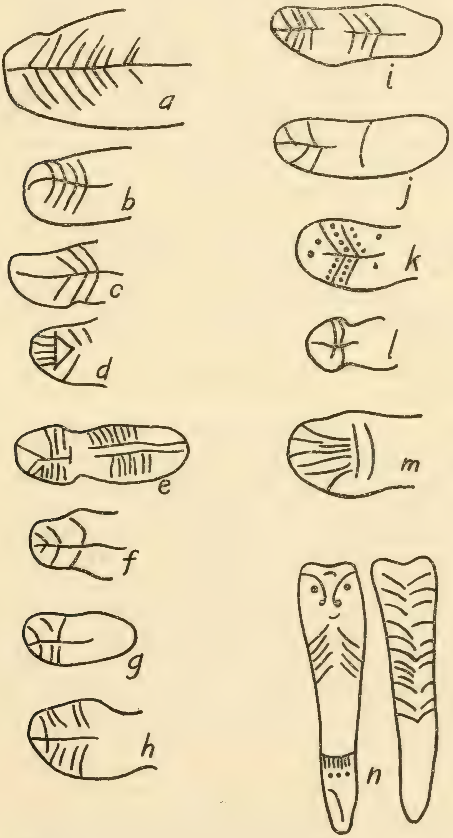


Figure 2.—Designs on carved slate effigies.

preserved of an incising, prior to the one now evident, as shallow marks near the present parallel rays. This artifact, while not an example of the potter's art, does attest the use of clay. It was probably not molded but carved and filed from the lump of hard unfired calichelike material. The only other clay object that I know (other than the questionable "Nampa Image" (Holmes, 1889, pp. 424–450)) is that illustrated and described by Strong et al. (1930, p. 67; pl. 11, *j*). It is not in the same category as this effigy.

The other aberrant piece in the series is B26/553 (pl. 20, *a*, 25). There is little that can be added to the information given in the table. The eyes, nostrils, and, presumably, toes are represented by drilled pits. No arms appear; I interpret the medial slanting lines as ribs.

Except for size, variations in outline and in incised or drilled decoration, the remaining carved stones are of a single type. The three blanks are interesting (B48/653(16); pl. 20, *a*, 5). Two are partially smoothed and shaped; one has not yet been roughed out. These indicate that the owner (burial 48) was yet in the process of making more of these little figurines.

The fir-tree-like design may be termed a headdress design or it could be (following Strong (1945)) called skeletal—a backbone and ribs. There are some differences between the objects of this type belonging to the different burials. Those of burial 48 have simple "headdress" designs with the exception of /655. Of burial 39's five, no two are alike. Four of them are liberally smeared with red ocher, while none of burial 48's had more than a faint stain in the incisions. Burial 26 had four, and all are different; three are still well colored.

Naturally Smoothed Stones

Peculiarly shaped pebbles were found in several of the graves. Their uses are obscure, but we may again quote Teit (1930, p. 196): "Charms or fetishes were in common use. Generally they were small smooth stones which had been picked up and kept because they showed some peculiarity in shape or color. . . ." Dawson (1892, p. 11), speaking for the Thompson area, mentions them, and Smith (1899 a, p. 160) says that "grotesquely formed pebbles of various bright and clear colors were sometimes found in graves . . . . they may have been prized as amulets or charms." This describes perfectly the class of objects, none of which can in any way be called artifacts but which are included here because of their association, that were found with burial 25 (7: pl. 20, *a*, 8–14, and pl. 12, *b*); burial 39 (3: pl. 20, *a*, 15, and pl. 14, *b*); burial 48 (10: pl. 17, *a*); and burials 12–13 (1: pl. 20, *a*, 21). It will be noted that three of these are also burials that had the flat carved slate figurines. The stone with burials 12–13 was probably associated with burial 12 to which was assigned the carved clay object.

As these are not artificial objects, there is no reason for giving exact measurements for each. Measurements can be taken with fair accuracy from plate 20, *a*, and the burial artifact plates where a representative series and the whole series are shown with included scales.

Here, as with the carved stones, the individuality of the collector of "lucky" stones is obvious. Burial 25's seven stones are all of varied shape. They are: a banana-shaped stone of andesite porphyry (/520); a mound-shaped one (/521); an elongate mortarlike stone (/522); a stone shaped like a large animal claw (/542); one with a double-beveled, saddle-shaped depression (/474); a round mortar-shaped stone (/526); and one reminiscent of a bird effigy (/475). Chamberlain (1892, p. 570) illustrates almost an exact counterpart of this latter stone on a necklace reputed to have power (Kutenai). The material is either andesite porphyry or dark quartzite. None of these has been used—the mortar-shaped stones show no stains of mineral paint. Some of the stones (the elongate one, /520, and the long mortarlike one) bring to mind the lingam and yoni symbols.

It is interesting that these stones and the flat carved ones were associated, with one exception. Even that exception (burial 26) was a burial with an extraordinary amount of nonutilitarian material. The suggestion seems obvious that the burials graced with effigies(?) and/or lucky stones might well have been persons of supernatural power. All of them had a goodly amount of general cultural material with them.

CHIPPED STONE

The chipped stonework from neither of these sites is particularly exciting, although there are a few pieces that will enliven the following discussion. Going, perhaps, hand in hand with this lack of variety is the relative paucity of chipped stonework. It is obvious that if chipped artifacts were not extensively used, they would not be apt to find employment in numerous and varied situations, and the need for variety in tool types would be small. The converse of this is also true. This relationship is obviously rooted in the culture with those attitudes and habits which revolve around war, the food quest and the use of animal products standing in the foreground in relative importance. As a result the chipped stone series from both sites can be conveniently laid out on a laboratory table. This eased the task of analysis, as the whole collection could be brought under inspection at one time.

45-BN-53

Chipped material from this site will be described first as a measure of removing it before plunging into the more extensive descriptions of the material from 45–BN–3. Terms and symbols used will be fully treated under the latter's site headings.

The two large petrified-wood blades (type I kc, see below) from BN–53 are both broken. Length measurements are impossible but enough can be said to indicate that they are the same types of blades so usual at 45–BN–3. Both are stemless, the base of one (cat. No. 13, *a*) is cut squarely across, the sides are parallel and then incurve (become concave) toward the point. The cross section is rhomboidal across the incurving part of the body. The width is 3 cm. and thickness is 6 mm. Measurements for catalog No. 13, *b*, are the same but the sides form an even convex curve from base to (?) point. The base of this blade slants at about a 12° angle. This is probably a diagnostic trait and will be noted as other blades are examined. If there is a difference in form between spear points and knife blades, it is likely that it may appear here. It is thought, now, that the slightly incurvate (concave) sides and square-cut base are more apt to appear on spear points and the slanting base and rounded sides on knife blades. Further information on this is anticipated as more sites and cave sites are explored.

Chipped Flakes, Scrapers, Cutting Edges, etc.

These are flakes of varying sizes and shapes that have been formed by percussion and retouched by pressure flaking along parts of the edges. It would be a matter of discussion to separate even this short series of 23 artifacts into cutting and scraping implements, other than the few that have a snub bit. Ten of the artifacts are petrified or agatized wood. The remainder are the less easily described cryptocrystallines. Two would usually be called flint, one a prase, one is obsidian; the others are forms of agate (carnelian, moss, etc.). It will be recalled that the Northwest is a paradise for collectors of various forms of agates and that differently colored and figured chips may be detached from the same agate nodule. Plate 21, *b*, Nos. 1 to 16, illustrates a variety of these generalized artifacts. There are a few (HP49/37, pl. 21, *b*, 16 and HP42/79, pl. 21, *b*, 10, etc.) that are, no doubt, scrapers. The blades are blunted and/or single beveled. Eleven of the 23 were more often used as scrapers than as knives. The remainder were knives or finer scrapers. Even with these, most, though not all, of the chipping is from one side so that a single-beveled edge results. A peculiarity well developed on a number of the chips is a semicircular chipped edge (45–BN3/B36/627 and –53/11, pl. 21, *b*, 1, 2, and 3). These concavities are usually 1 to 2 cm. across. They appear to be pressure chipped and may have served some specialized scraping use—possibly in woodworking.

One crudely shaped but evenly chipped flake (pl. 22, 15), 45–BN–53/HP 42/68, may be either a scraper or a stemless projectile point.

It is small (length 3.2 cm., width 1.8 cm., thickness 5 mm.) and made of brown chert. One side is the flat flake surface, the other is the convex, humped outer surface of a core. It is rather thick centrally for a point. The wide end, or blade if it is a scraper, is finely retouched from the flat surface.

Projectile Points and Knives

It is not a simple matter to separate knives, spears, or lance points, and the larger arrow points. This must be done on the basis of knowledge of a culture and of understanding of the material. Admittedly, there would be changes in any such functional separation as research in an area expanded. The knives used by women in housework and those by men in the hunt, war, and woodwork may be different tools. One more site as productive of the remains of haftings as BN–3 should make it possible to distinguish knives from large projectile points in most of the cases. The distinction of a spear point from a knife is another matter. The haftings which we found might possibly have been the broken head ends of spears of the short thrusting type, which were in use among the Umatilla (Ray, 1942, p. 152). Therefore, in the following discussion, such functional terms as seem indicated will be used with the proviso that they are *probably* correct.

Two whole projectile points and four fragments were found. One is clear quartz, one flinty, three are of a brown jasper, and one a pink chalcedony. Of the four fragmentary, two are parts of the blades and are not diagnostic. One (53/HP 70/30, pl. 22, 16) is the butt of an elongate triangular point made of a thin flake of clear quartz retouched on one side. The base (all points are described from the base to the point) was square cut and the sides curved evenly and with a slight convexity toward the point (probably a type I point, see below). Both stem and point are broken from the white flint, thick bladed –/63. The shoulders are square; there is little barb development. The sides are slightly incurved toward the point. The body of the artifact is thick (4 mm.). It was found near the surface of the midden test.

Of the two whole points, one, /12 (pl. 22, 18), is a surface find, and the other, /64 (pl. 22, 25), was in the second level of the midden test. Both show a flat flake surface and are stemmed. The base of the large one, –/12 (II *c*) is almost square cut. The sides of the stem slant inward toward the central axis. Shallow corner notches (with barbless up and outsloping shoulders) terminate the short-stemmed section. The blade is slightly asymmetrical, the sides smoothly convex, length 4.3 cm., width 1.7 cm., central thickness 3 mm., stem length 6.5 mm. Item 45–BN53/64 (II, *fa*) is a tiny artifact, the type often called a bird point. The base of its stem is slightly concave, the stem sides slant inward toward the centerline. Corner notches are deeply cut and the point is well barbed. The blade is broad, short, and the sides slightly and smoothly convex. It is made of a flake, flat on both sides and, like the preceding point, has been retouched from both sides, length is 1.9 cm., width, 1.3 across barbs, thickness 1.5 mm., stem length 4.5 mm.

Gravers

One white flint graver (/59, pl. 22, 31) was found. The tool is a crude angular flake of white flint. One end has been chipped to a long tapering point. The tip of this has been broken but the length of the point, the graving blade, is now 1.0 cm., the artifact is 3.1 cm. long. In fashioning the artifact, flakes were removed from the sides and point of the tapering graver blade

45–BN–3

Chipped Flakes, Scrapers, and Cutting Edges

As with the previous, shorter series from BN–53, many of these flakes could have served as scrapers or knives. The more specialized are made from rather carefully selected flakes. These have been chipped, nearly always from one side, so that the more evenly rounded parts of the circumference of the flakes have a steep single-beveled edge—the typical scraping-planing bit. Most of the flakes selected are rather elongate with one end expanding. It is, of course, this widest end that has been chipped into a scraping bit. There are 15 of these better made scrapers and 11 that were less carefully made. A gamut of varicolored agate, chalcedony, flinty chips, and petrified wood was used as materials. Of the 15, 6 of the best examples were found with burials. Four of the 11 chipped flakes were with burials (?), 3 of the 6 double-beveled chipped flakes also were so associated (?). While there is always doubt as to the association of a retouched flake with a burial, when it is simply found in the fill around the skeleton, there is little doubt that the 6 better scrapers were so associated.

There are some deviants in the series which may be no more than that but which may, when a more extended series is available, prove to represent distinct types. They will be accorded the descriptive remarks that their variations seem to warrant. One, 45–BN–3/B49/680 (pl. 21, *b*, 5) is a tabular, slightly curved piece of petrified wood. It is a rectangular scraper, gouge, or skinning tool, etc., and is chipped completely around the four edges. The bit is irregularly rounded. The chipping was done from both sides so that the edge is not properly a single-beveled one—although one bevel (from the top or convex surface) is deeper and longer than the other. Most interesting is the evidence of hafting which remains at the butt, the square-cut end. For about one-third of the length of the piece there is a stain of black, probably organic, material which seemingly served as a cement in hafting the blade. The piece is 6.3 cm. long, 3.6 cm. in central width, and 5 mm. thick.

Another unusual piece has an expanding bit. The sides of the scraper have been chipped to rather sharp concave curves for convenience in hafting (BN3/430, pl. 21, *b*, 11). These two unusual scrapers and a sufficient series of the run-of-the-mill variety are illustrated in plate 21, *b*.

The 11 retouched flakes show double- or single-beveled chipping along some portions of their edges. The materials are as varied as usual. Two of these flakes (–/B23/537 and –/B36/627, pl. 21, *b*, 2) are elongate and chipped into the edges are crude semicircular cutting edges. It should be mentioned that these flakes do not appear to have been made or selected especially for their duties. Any large flake was chosen. The scrapers, however, depended upon the utilization of a flat, broad, heavy flake of even thickness. Tools of this same type are illustrated by Smith (1910, p. 68) from the Upper Columbia and by Strong et al. (1930, p. 86).

Three flakes and two small core pieces have two-beveled chipped edges. All but two, an end-sharpened core (/B25/523) and a triangular flake (/509, pl. 21, *b*, 14), could easily be fragments of shattered knives, although they probably are not. Another large flake or small core has been sharpened primarily from the side while the natural bevel of the flake aids in providing the edge (–/B25/540, pl. 21, 12). Nos. 6, 7, 8, 9 (pl. 21, *b*) are typical flake scrapers with single-beveled edges. End scrapers appear to have been preferred to side scrapers in the area.

Blades and Points

It is obvious that the blades in the small collection from 45–BN–3 represent some of the types in use in the area during the terminal phases of Indian occupation. In order, then, that the direct-historical method may function best and because the material lends itself to the treatment it would seem well to set up a wholly descriptive typology which may be used, tested and refined or altered, and perhaps even discarded by future field and laboratory investigators. The main value of such a system is that it is a time and space saver in such reporting as this. For greater flexibility, it may be used with an appropriate adjective as type II b, crude and/or small.

Type—I stemless:

I k: Long knives with essentially parallel or smoothly curving sides. Points sharp, bases square-cut or slanting; petrified wood preferred material. See B5/175, B4/92, B36/609, B26/501,/268 in table 12 for this type; illustration references for all specimens will be found in table 12. Note references to and description of haftings. Specimen B5/175 is the type example of I k—slant base. Execution is usually poor to mediocre. Cross section, oval. (Fig. 3, I k.)

I ka: Represented by a single specimen, B7/186. It is a broad knife blade, the base concave. Workmanship exceptional. Cross section a thin oval. (Fig. 3, I ka.)

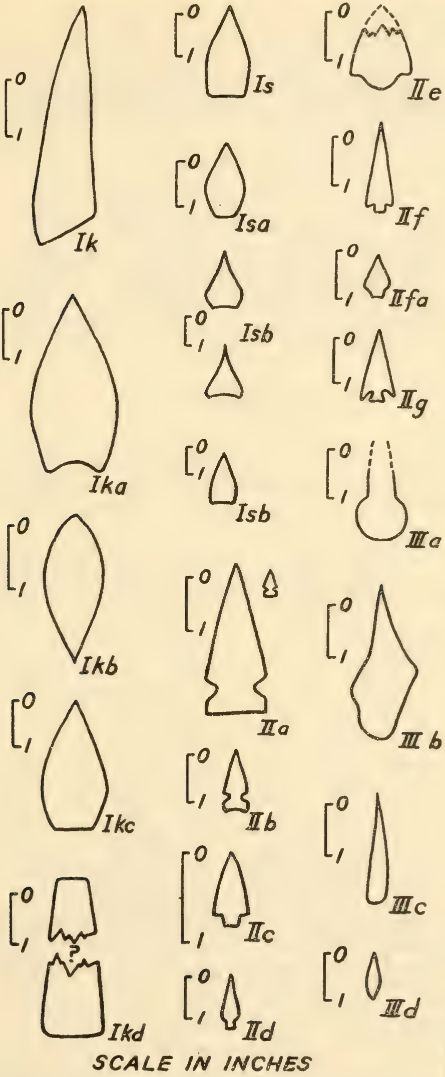
I kb: Two specimens, B37/603 and /326, are a short, stubby type of knife. No. 603 is leaf-shaped, or elliptical with a sharp point and more rounded base; a thick heavy-duty blade. Oval in cross section. This is a ubiquitous form. (Fig. 3, I kb.)

I kc: This type, with the linear I k, makes up the bulk of the knives. Like I kb these triangular knives or spear points are short and heavy. Those artifacts of this type that were used as knives were no doubt the utilitarian types used by women and men about the home and fishing places. The long I k blades may well have been war knives or weapons carried by men when hunting large animals. Specimens are B25/518, B45/677, and /699. The first was hafted. Nos. B43/664 and B48/660 are more or less intermediate between the more definite types I k and I kc. Bases are slanting or concave, the sides are usually irregularly convex and come to a rather blunt point. The base is usually less wide than the greatest width which is between one-third and one-fourth of the distance from base to point. Oval cross section. The type is not uncommon. (Fig. 3, I kc.)

I kd: This is a questionable type. In it belong two pieces, /510 and /511, both broken, which may be parts of one object. If so, I kd is a triangular knife approximately 9 cm. long, very crudely chipped of quartzite. It is thick and both base and tip are convex. There is no true point but the long triangle of the blade is truncated. If valid, the type must have been a knife-scraper type of tool. Oval cross section. (Fig. 3, I kd.)

I s: This large category, with its subtypes, includes the remainder of the nonstemmed or nonnecked blades. I believe that these are spear or very large arrow points and have used the "s" to indicate that and also to indicate that use, if known, is a part of typology as much as shape or material. At present it is considered that the function of the various tools in the complex being described is known and this knowledge (?) is embodied in the classification. Such an approach is largely experimental and may well have to be abandoned. Specimen /699, classified under I kc, might be a connecting link between that type and the one under consideration. Specimens B12/311, /194, and B7/236(a) are type specimens. All are of moderate size, made of petrified wood or chert, bases are slanting or square cut, sides slant with a slow and irregular curve to a moderately sharp point. Chipping is poor to mediocre. Two variants of I s appear. (Fig. 3, I s.)

I sa: The basic shape of this type is rhombic or diamond. One end is then truncated for the square-cut or incurved base, giving a pentagonal final shape. Type specimens are B7/29 and B48/659. It will be noted that the former has slightly concave sides curving to


Ik
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SCALE IN INCHES

FIGURE 3.—Projectile point, knife, and drill types.

TABLE 12.—*Stemless blades and points, 45–BN–3*

Specimen No.	Type	Plate No. and remarks	Length (cm.)	Basal width (cm.)	Maximum width (cm.)	Central thickness (mm.)	Material	Base
/14	I k?		(1)	(1)	3.2	5.5	Petrified wood	Broken.
B7/29	I sa	8, *b*, 28	4.7	1.7	2.7	7.0	Pink chalcedony	Concave.
B7/30	I sb	8, *b*, 26	4.0	2.6	2.7	5.0	Dark chert	Do.
B7/31	I sa	8, *b*, 23	4.7	(1)	(1)	5.0	Pink chert	Slant, broken.
B4/92	I k	22, 2	14.0	2.8	2.3	6.5	Petrified wood	15° slant.
B5/175	I k	22, 1	18.1	2.5	3.1	8.0	do	Do.
B7/186	I ka	22, 3; 8, *b*, 17. Excellent specimen; hafting stains to 1.4 cm. from base.	8.6	3.3	4.4	6.0	White chalcedony	Concave.
/194	I s		(1)	2.3	?	?	Petrified wood	Slant.
B7/236 (a)	I s	8, *b*, 27	4.1	2.6	2.5	5.0	Dark chert	15° slant.
B7/236 (b)	I sb	8, *b*, 22; crude	4.2	2.5	2.6	8.0	Petrified wood	Concave.
B7/245	I sb	8, *b*, 24	4.3	2.5	3.1	5.0	Dark chert	Do.
B7/248	I sb	8, *b*, 21; crude	(1)	1.8	2.1	7.5	Petrified wood	Do.
B7/249	I k	Broken centrally	(1)	1.5	(1)	(1)	do	Incurved.
B7/253	I sb	22, 8; crude	4.7	2.2	1.7	5.0	do	Slant?
/268	I k	22, 4	8.6	1.9	2.1	8.0	do	Square.
B12/311	I s	22, 6	4.8	1.8	1.7	4.0	do	Slant.
/326	I kb	Only broken base remains	(1)	(1)	(1)	(1)	do	Pointed.
/429	I sb	22, 14; crude	4.5	3.5	3.4	5.0	Dark flint	12° slant.
B26/501	I k	26, *c*; hafted. See Perishable Artifacts.	10.0	1.8	2.3	7.0	Petrified wood	Hafted?
B26/502	?	15, *b*, 11	(1)	(1)	1.5	4.0	Dark chert	Broken.
B26/503	I k	Broken centrally	(1)	1.6	(1)	(1)	Petrified wood, red	Square.
/510	I kd	22, 10; may match with /511	(1)	3.5	3.5[1]	11.0	Quartzite	Convex.
/511	I kd	22, 10; may match /510	(1)	1.6	2.5[1]	8.0	do	Convex (point?).
B25/518	I kc	22, 13; 26, *b*; hafted. See Perishable Artifacts.	6.1	2.9	3.5	6.0	Petrified wood	15° slant.
B37/603	I kb	22, 7	7.1	(2)	3.2	10.0	do	Pointed.
B36/609	I k	26, *a*; hafted. See Perishable Artifacts.	12.6	1.4	2.1		do	Broken?
B48/658	I sa	22, 5	5.5	1.5	2.1	6.0	do	Concave.
B48/659	I sa	22, 11; with wood hafting; stain shows.	4.0	.95	2.1	5.0	Yellow-white flint	Slant.
B48/660	I k	17, *a*, 17; small	6.8	1.4	1.8	6.5	Petrified wood	square.
B43/664	I k	Hafted; see Perishable Artifacts	6.7	1.3	2.1	(3)	do	
B45/677	I kc		5.4	2.8	2.5	7.0	do	Concave.
/699	I kc	22, 12	4.8	2.2	2.3	6.0	do	8° slant.

[1] Broken.
[2] Oval.
[3] Hafted.

the point, while the latter is a close approximation of a perfect rhomboid. This type was rare in the north. (Fig. 3, I sa.)

I sb: Type specimens B7/245 and B7/30. Both dark chert. Basic shape a rhombus but one end removed to provide a wide, usually incurved base. Sides leading to the point are chipped to a concave or incurve more often than they are left straight or curving out. Approaches a rhomboid in cross section. (Fig. 3, I sb.)

I sb crude: Here, although the incurving point remains, the base has lost its character and is simply broadly outcurving or is roughly parallel sided instead of the sharply shouldered central section of a rhombus. Specimens /429 and B7/236(b) are type specimens. (Fig. 3, I sb, *lower*.) An oval cross section is typical of all knives and spear points. It will be noted that particular attention has been paid to the angles of truncation of the base. Although the series is short it appears that this was often slanted for greater ruggedness and durability in hafting—for the same reason that it was incurved. A larger series may settle the problem.

Broken Blades

Twenty-eight pieces of broken knife blades, apparently mostly of type I k, were found during excavations. It is peculiar that these are all points, side fragments, or central sections. With the exceptions of three possibilities there are no basal pieces in the collection. All but two are of petrified wood. The large number of longitudinal sections (side fragments), of which 12 were collected, is a function of the peculiar manner in which the tabular pieces of petrified wood split. This is often following an old growth ring. Most of the fragments, of which five are illustrated (/F3/198, –/485, –/456, –/86, and –/B12–14/370; pl. 21 *b*, 19, 21, 20, 17, 18), are well made to mediocre, but –/485 is crude.

A possible explanation for the predominance of point fragments in the collections exists in the fact that a broken but well-hafted knife blade might often be resharpened for further use. Eight of the fragments were found near enough to burials so that they might have been associated with them. As was previously stated in a similar context, such material might have been included in grave fill, or it might represent a killed artifact. Six of the eight burial associations were found close to the burial, but these burials (7, 12–14) were disturbed and the original position is thus unknown. Only two artifacts in the category under discussion (–/B36/620 and 621) were associated with a burial and given a position in the grave. They are the least fragmentary of the series. This fact goes hand in hand with that which has, no doubt, been observed throughout the paper: the major portion of all categories except retouched flakes have been burial associations.

Stemmed Points

Type II—stemmed and neck-stemmed, all made on basic trianguloid shape (table 13).

II a: A neck-stemmed type. Side notches curved, usually shallow; neck between the notches not well defined in /369 (which is large and might be II ka or III sa), /418, or /545. These types thus retain more of the basic trianguloid shape than others in the series. The base itself is slightly incurved and the corners are fairly sharp. Most of such finds are not burial associations. One wonders if the triangular-side notched point will have chronological significance in the Plateau as it has in the Southeast and Southwest. Obviously the large and small extremes of II a, as shown here, are not typologically similar. Perhaps the large should be called II ak (knife) and the small II aa (arrow) for the present. (Fig. 3, II a.)

II b: No. 612 is a variation of the preceding. It is longer, the side notches are shallower, and the slight basal incurve has been increased to a deep indentation which bifurcates the base and gives the point a fishtail appearance. The sides of the base thus become long barbs. The cross section approaches a rhombus. With most other points it is oval. (Fig. 3, II b.)

II c: Represented by two points, both tiny, is a simple and elsewhere very usual form (B7/33). The basic triangle has been altered by the nearly square-cut removal of the corners. Stems often expand slightly toward the base and may be otherwise asymmetric; basically, they are rectangular. (Fig. 3, II c.)

II d: Not a well defined type. All examples are broken. The notches are apparently corner notches as with the preceding type but instead of being cut squarely, the upper edge slopes up and outward. There is a complete lack of barbing. One of these broken points is coarsely serrated (/447). (Fig. 3, II d.)

II e: Another variant of II c (512). Here the single example, a large white flint point, might well be a spear head. The corners slant up and inward so that there is a slightly better development of barbs than with the similar (in this respect) II c. Instead of being a crude rectangle, the stem is a thinned semicircular extension of the body. (Fig. 3, II e.)

II f: Also a variant of the basic II c (695). It is a long, slender, delicate and finely serrated point. The corner notches are sharply and neatly cut inward and upward (toward the tip) so that a short, sharp barb is formed. The stem, basally slightly incurved, also expands basally. (Fig. 3, II f.)

II fa: See Projectile Points, 45–BN–53. (Fig. 3, II fa.)

II g: As a type, completes the movement of the notch from a side position (II a) to a corner (II c) through II e, II f, and to the basal position. The notches may slant inward and toward the tip of the point, or they may, as with /604, be almost parallel to the central line of the point and to each other. The stem is usually incurved basally although /604 has a very fine basal notch which probably provided further stability in the hafting. Basally notched points of the same type are shown on plate 15 of Strong et al. (1930). This type is the classic Columbia River point. (Fig. 3, II g.)

TABLE 13.—*Stemmed points, 45-BN-3*

Specimen No.	Type	Plate No. and remarks	Length (cm.)	Basal width (cm.)	Central width (cm.)	Central thickness (mm.)	Material	Stem
/9	IId	Corner notches; slope to point	(1)	(1)	(?)	(?)	Petrified wood	Simple; broken.
B7/33	IIc	8, *b*; 31; corner notches; slight barbs	2.1	[1] 0.45	0.7	2.0	Clear chalcedony	Simple; expands basally.
/169	IIa	Side notches	2.2	1.4	.8	3.0	Flint	Neck stemmed.
F3/197	IIc	22, 24; corner notches	2.2	.4	.9	2.5	Fine basalt	Simple; rectangular.
/202	IIg	Probably basal notches parallel with sides of stem.	(1)	(1)	1.3	2.0	Dark chalcedony	Broken.
B12-14/369	IIa	22, 20; large; fine material and execution; probably spear point.	7.2	3.1	2.1	6.0	Petrified wood	Neck stemmed.
/418	IIa	Small; side notches	1.5	1.4	1.1	1.5	Chalcedony	Do.
447	IId	22, 28; serrated, corner notches	(1)	(1)	Ca. 1	Ca. 2.5	White flint	Simple; broken.
512	IIe	22, 17; serrated; corner notches slight barbs.	(1)	1.3	2.0	3.0	do	Simple; rounded semicircular.
/545	IIa	22, 23; small	1.4	.9	.7	1.5	Flint	Neck stemmed.
B30/576	IIa	22, 21; fine material and execution; probably spear point.	2.6	1.5	.9	2.0	Petrified wood ?	Do.
B29/577	IId ?	Corner notches	(1)	(1)	.7 ?	3.5 ?	Chalcedony	Simple; broken.
/604	IIg	22, 34; basal notches parallel with sides of stem.	3.5	.5	1.0	3.0	Dark chalcedony	Simple; expands basally.
B36/612	IIb	22, 19; bifurcated basal barbs	3.5	1.2	.8	4.0	Pink chalcedony	Neck stemmed.
B36/614	IIg	22, 33; basal notches parallel with sides of stem.	3.0	.6	.95	3.5	Brown flint	Simple; rectangular.
B36/632	IIg	22, 27; fine; serrated; barbs extend to base.	4.3	1.1	1.5	3.5	Mottled chalcedony	Simple; expands basally.
/690	IIa	22, 22; finely made; probably spear point.	2.3	1.1	.8	1.5	Obsidian	Neck stemmed.
/695	IIf	22, 26; serrated, corner notches	5.0	.7	.9	2.5	Petrified wood	Expands basally.

[1] Broken.

The series of blades and projectile points from 45–BN–3, although small, has been sufficiently varied so that there is no need to defend its use as a basis for a descriptive typology. It is anticipated that this typology may be of use in further analysis of Plateau archeological material. To that end the percentages of types are given below (table 14). If the series has been extensive enough (which is doubtful) so that it represents a cross section of the forms as they existed and were used in the area during the early contact period, alterations of the type percentages or of the types themselves will indicate cultural or chronological change, or both. Upon the extent of these alterations, other categories in the collections being similar or equal, must rest judgment as to the validity or usefulness of such a series as has been set up.

TABLE 14.—*Point type percentages, 45–BN–3*

Unstemmed			Stemmed		
Type	Number	Percentage	Type	Number	Percentage
I k	10	32	II a	6	33
I ka	1	3	II b	1	5.5
I kb	2	6	II c	2	11
I kc	3	9	II d	3	16.5
I kd	2	6	II e	1	5.5
I s	3	9	II f	1	5.5
I sa	3	9	II g	4	22.
I sb	7	21			
?	1	3			
Total	32	98	Total	18	99.0

Drills

Drills, which are here as elsewhere aboriginally often reaming drills, were not numerous. Seven examples of four distinct types were found. Data on these are given in table 15. A description of the types will adequately describe the series.

Type:

III a: Elsewhere at least, a very typical artifact. The base, as the artifact stands, is convex basally, wide and curves smoothly in to the evenly tapered point. The tip is broken so a length measurement is not possible. The large base indicates that this drill may be a handtool. See Strong et al. (1930, pl. 16) for drills of this type. Type specimen is B7/247. (Fig. 3, III a.)

III b: Very possibly not a true type. Such variant tools are often expedients, roughly comparable to the use of a large nail as a punch, an expedient which someone carpentering under difficulties in our culture might use. Type III b is simply a large, elongate flake that has been given a drill-shaped point at one end. (Fig. 3, III b.) The tool would not be convenient for fine work. Similar objects are illustrated in Strong et al. (1930, pl. 16, *f*, *g*).

III c: Like III a, a rather ubiquitous form of drill in America. The base expands at a fairly sharp-curved angle from the smoothly

TABLE 15.—*Drills, 45–BN–3*

Specimen No.	Type	Plate No. and remarks	Length (cm.)	Basal width (cm.)	Central width (mm.)	Central thickness (mm.)	Material	Base
B7/247	IIIa	22, 35; oval cross section; example of an ubiquitous tool.	(1)	3.2	(1)	(1)	Red chert	Broken, expanding, probably convex.
B12/302	IIIb	22, 38; tapered drill point; made on large flake.	7.1	(2)	10, of point	3.5, of point	Brown chert	Irregular.
B24/533	IIIc	22, 36; long, slender, rhomboid cross section.	5.1	1.0	6.0	4.5	White quartz	Slightly concave; small expanding.
B41/599	IIIc	Long, slender, rhomboid cross section, unfinished; material flawed.	6.4	1.3	7.0	3.5	Petrified wood	Expanding but unfinished.
B49/683	IIIc	22, 37; oval cross section	4.3	1.9	7.0	3.0	Gray flint	Large, expanding; slants slightly.
/692	IIId	22, 29; irregular; rhomboid cross section; double pointed.	2.1	(3)	5.0	3.0	Gray flint or quartz	No base; double pointed.
/696	IIId	22, 30; double pointed	1.9	(3)	5.0	2.0	do	Do.

[1] Broken.
[2] Irregular.
[3] None.

tapering point. Essentially the form is that of III a, but these III c drills were rather certainly intended for use on a shaft, while /247 (III a) might well have been grasped for use between the thumb and forefinger. As such, type III c forms, smaller and more delicately and evenly chipped, would have functioned almost wholly as drills, whereas /247 is both a drill and a reamer. Type specimen is B24/533. (Fig. 3, III c.)

III d: These two fine drill tips are double pointed. They show no evidence of hafting as do some of the large blades, nor can there be certainty that only one of the two points was intended for drilling. I believe that either point of these microliths was thrust into a soft wood shaft and functioned in fine drilling. These tips could then be conveniently resharpened in the shaft. Type specimen is /692. Neither of the tips was found with a burial. One was a surface and one a back-dirt find. (Fig. 3, III d.)

Gravers

One graver was found at 45–BN–3. A single find was also made at 45–BN–53, although this site had a far smaller total artifact yield. Specimen /387 (pl. 22, 32) of chert has two points, one well developed, though short and heavy, and the other less so. The object is 4.1 cm. in greatest length, 2.8 cm. in width. The best developed graving point is 8 mm. long.

Summary

The material used for both chipped and ground stone objects has been given throughout in the discussion of artifacts. A résumé need not be given here. It might be well to stress, however, that the cobble and shingle beaches of the Columbia and its tributaries furnish a variety of igneous material. The mountains surrounding the Plateau can furnish nearly any petrologic material in both igneous and sedimentary ranges. The more enduring materials, such as diorite and andesite, appear as river-worn cobbles almost from the sources to the mouth of the Columbia River. There is probably a close relationship between the percentages of materials on the cobble beaches and in the artifact series.

We note a number of large coarse implements. The implication is that rough and ready techniques were much more the rule here than, for instance, in the Southwest.

Net sinkers of two basic types, rectangular and notched, may have historical or areal differentiating value. Certainly the notched sinkers were not preferred at 45–BN–53. Indeed, all tools at 45–BN–53 were heavier and cruder. Probably this was because of the lack of burials and midden. Like most widespread tools the notched net sinker was easily made. Most sinkers were smoothly circular or oval in outline—shapes unlikely to entangle. Two- versus four-notched sinkers may be a question of individual preference. Survey data in McNary and other reservoirs seem to indicate a lessening of use of net sinkers as one goes upriver.

Of course, there is a poor showing of the larger artifacts that must once have been numerous around the sites. Collectors have taken the best; hence we probably have a lopsided view of some artifact types.

Of interest are the basalt files or rasps, actually basaltic scoria. These work wood or copper easily and will make an impression on the serpentines and andesites. It is surprising that more files were not found.

The pipes, as can be seen when scanning the measurements, show little variation in all except length. This may be fortuitous.

The series of shaft smoothers (see table 9) is rather short for a final statement but it does appear that there will be a high correlation between the diagonal groove and volcanic tuff as material.

Hopper mortars are postulated. It is difficult to see how the flat grinding slabs could have been used efficiently otherwise. Some long pestles were no doubt used with wood mortars; they were usually "killed" when used as grave furnishings.

BONE AND ANTLER

45–BN–53

Antler

Only two pieces of antler were taken from BN–53; one was a surface find. It is a point of a small tine, 12.5 cm. long, and has been cut at the proximal end; it may have seen use as a flaker. The other, a fragment from near the fire area of house pit 11, may have been worked.

Awls

Three awls were found. Two bird-bone splinter awls (53/HP 42/80, pl. 23, *a*, 20, and HP 42/38) were in the same house pit. They were not associated. The other awl (HP 49/53, pl. 23, *a*, 29) is an excellent example of an (probably elk) ulna awl (17.2 cm. long). It is the only example of a widely used tool found in either of the two sites under discussion.

Bone Beads

One bird-bone bead, broken at both ends (HP 42/75, pl. 23, *a*, 25), is the only example in this category. It has a sawed V-notch at one side of one end like the half of an arrow nock and is decorated by two lines of short parallel transverse incisions running part way up the barrel and parallel with it, and one partial line which begins to spiral around the barrel. The small lines of this latter are, however, connected basally by a diagonal. With this exception the very simple decorative complex of the area is preserved.

Altered Fragments

One distal end of the tibia of a large bird (4.7 cm. long, HP 11/46) illustrates the method used in separation of tubular pieces: sawing or filing and breaking.

A large splinter of heavy bone, possibly elk femur (67), found in level 2 of the midden test may have been used as a digging or beaming tool, the edges are rounded and smoothed (22 cm. long).

45–BN–3

Antler Digging-Stick Handles

Ten specimens, all burial associations, are recorded in the catalog. All, too, were deer or elk antlers. The fragmentary condition of these artifacts prevents certainty as to which of the two Cervidae are represented more often, but the size of the objects indicates a preference for elk. B44/644–5 (pl. 23, *a*, 1) is certainly elk. These larger antlers would be less apt to break at the perforation and would make more comfortable hand holds. The above-mentioned specimen, the only one wholly restored, is 33.5 cm. in length and weighs 6½ ounces. An examination of the other fragments indicates that it was the largest in the collection but that many of the others approached it in size; a fragmentary piece from burial 52 may have been larger. Only one specimen (B48/657, pl. 17, *a*, 28) is manifestly smaller than the general run (which varies just below 644–5). It (657) is 13.5 cm. from the tip to the center of the hole while 664–5 is 24.0 cm. It is possible, but cannot be shown, that B48/662 and 657 are parts of the same handle (pl. 17, *a*, 28 and 32). They were not together in the grave but may be parts of a killed artifact.

The burials which furnished the antler artifacts in question were 4, 7, 25, 35, 39 (several decayed fragments), 44, and 48. The first 3 and 39 are female, 35 and 44 were male, and 48 a child. The digging-stick handle is, of course, primarily part of a woman's implement. It would thus appear that there was no thoroughgoing rule that the objects placed with the dead must be those, and only those, that they might have used in life—or the division of labor was not as strict as we sometimes believe it to have been.

Of further interest is the shape of the perforations in these specimens. These holes, which received the digging stick, are (in the two specimens where preserved) elliptical in shape and conical; the perforations taper from one surface of the antler to its opposite surface. The larger opening was placed on the bottom (toward the point of the digging stick). Thus every thrust of the implement would serve to wedge the cross handle more securely onto the stick. Collier et al. (1942, p. 82 ff.) describe and illustrate the same situation as does Smith (1899, pp. 137–138). The reversible handles of Ray (1942, p. 145, No. 2072) point to the same construction and suggest that the conical hole may indicate a double-pointed digging stick.

Decoration of the BN–3 specimens is limited to B35/579 (not illustrated), which has a series of lines 7.5 and 5.5 cm. from the tip, and B48/673, which has a series of notches carved at the tip. Decay has all but obliterated the incising on both fragments.

Antler Wedges

Archeological information indicates that elk or deer antler only was used for splitting wedges by the people of BN–3. Nine fragmentary specimens were collected. The very fragmentary condition of all may be attributed to the rough usage which a wedge normally receives. The many cracks caused by repeated blows would contribute toward rapidity of decay.

Again, all wedges were burial associations. Burials 4, 5, 7, 8, 26, 36, 48, and 49 possessed all 11 wedges or wedge fragments. Two of these, B5/163 (pl. 23, *a*, 6) and B7/250 (pl. 8, *b*, 16), are antler tips sharpened to a dull double-beveled point. They probably are, but may not be, wedge fragments (chisels, flakers?).

There is not a single specimen in the collection that is whole. Consequently measurements are of no value. Apparently specimens B8/258 (pl. 23, *a*, 8) and B48/771 (pl. 23, *a*, 15 and pl. 17, *a*, 29) are nearly whole. Their dimensions in inches may be taken from the plate. They are 12.5 cm. long × 3.6 cm. wide and 11.0 × 3.6 cm., respectively. The fragmentary antler tool shown over the lower leg bones of burial 36 (pl. 13, *b*) and unfortunately not shown assembled in plate 14, *a*, 3 and 4, and only in part in plate 23, *a*, 5, was 16.5 cm. long × 6.0 cm. wide across the center of the blade and 1.5 to 2.0 cm. thick. This object thins to a single-beveled edge at both ends. One cannot be sure whether it is a decayed wedge or a type of scraper. B26/547 (pl. 15, *b*, 23) is broken but was probably a very large, heavy wedge. B49/682 is badly broken, fragments of a checkerwork (?) mat (see "Perishable Materials") adhere to it. It may have been a wedge, but might also be spatulate and thus come under the following heading. Short heavy wedges, sharpened with a single bevel like B4/83a (pl. 23, *a*, 7), would seem to have been the most useful type for splitting wood, while longer and lighter ones may have been used in barking trees.

The antler wedge is an almost continentwide tool. It appears from the Southeastern Archaic through adjacent areas to California and on up to Bering Straits. The implements themselves are as variable as different cultures and uses could make them but the basic functions remain the same. Trees were felled, split, and barked, and the wood was carved with these implements or their variants. It is apparent that the Plateau was an area with no small development in woodworking and, as such, it would appear to have been peripheral to the Northwest coast. Ray (1942, p. 145, No. 2104) shows the single beveled wedge as characteristic of our area; this is in agreement with the archeology. A passage descriptive of the use of these wedges and the stone mallet may be found in Coues (1893, vol. 2, p. 640). The mallet and wedge method of woodworking is another Plateau-wide trait (Strong et al., 1930, pls. 10 and 21).

Probably these wedges were similar in appearance to those shown by Smith (1910, p. 57, fig. 39, and 1900, p. 414, fig. 345).

Miscellaneous

Spatulate tools were rare. Only three were found; two of these were with burial 7 (227 and 246, pl. 8, *b*, 13 and 14). The first is antler and has been worked to a thin single-beveled point. It could be a light wedge or antler scraper or weaving tool. The second is broken but the point remains. It is a flat, sharply double-beveled spatulate of the leg bone of a large mammal. It shows a use polish and is no doubt a matmaking tool (punch, or perforator, etc.).

B26/500 (pl. 15, *b*, 24) is altogether too long (15.1 cm.) and slender to be considered as a splitting or stripping wedge. It, too, was either a scraping or a mat-weaving tool.

Bone awls were, with no exceptions, broken. Only eight fragments were found. Two were listed as burial associations but only one (B44/650 (ulna?), pl. 23, *a*, 24) was certainly associated.

Three types are represented: (1) those of light bones, triangular in cross section (pl. 23, *a*, 18, 24); and (2) flattened rib awls (264, pl. 23, *a*, 19) and (3) those fashioned of heavy solid bone and retaining none or but little of the natural conformation. There were three of the first, one of the second, and four of the third type. The rib awl is white and hard. All others are in advanced decay. Obviously, this series from BN–3 is altogether too short for comparative purposes. The only type which bids fair to prove to be interesting or diagnostic is that of the triangular probably scapula awls (apparently similar to Strong et al., 1930, pl. 7, *f* and *g*). Until a better sampling of these small tools is taken from the area under study, there is little value in comparative notes. One possible needle fragment is included in this series.

A single *flesher* was found with burial 7. This type of tool, widespread, was used for removing hair, fat, membrane, etc., from stretched hides, and for graining. It was used like a long-bitted, handleless adz. It (pl. 8, *b*, 15, and pl. 23, *a*, 21) is 17.8 cm. long, 2.0 cm. wide at the base and 1.8 at the bit. The object, 1.5 cm. thick at the base, thins rapidly toward the bit on the proximal side. The bit is serrated; eight teeth were formed around the curvate edge. While extensively altered it is obviously made of either an elk or deer tibia. It is a much smaller and lighter tool than similar ones often seen from the Plains (bison bones) and North (moose). The upper, broken end shows wear and the implement was used in its present, shortened condition. It will be recalled that burial 7 was a female, and the flesher is certainly a woman's tool. Its type of skin working tool is typical of the Plains, some of the Southwest, parts of the Great Basin (possibly under Plains influence), and the northern forests to the Tena. It may well be part of the late Plains cultural spread into the Plateau.

Bone pins occurred with two of the graves: burial 8 (257, pl. 23, *a*, 23) and B26 (499, pl. 15, *b*, 22) and as one isolated find (296, pl. 23, *a*, 22). The first, the only whole specimen, is 20.2 cm. long, 1.1 cm. in diameter, and is grooved 1.3 cm. from the blunt end. It, and the others, were probably fashioned from the heavy bone of elk or deer tibia. B26/499 shows the remnants of ringed and cross-hatched incised decorations. Filing marks on the two less decayed pieces illustrate the final step in shaping. The wear is greatest at the points.

The whole one of these objects was obviously single pointed and probably the others were. Such pins might have seen a variety of uses. They have been mentioned as pries to remove eels from rocks; they might well have been large awls used for coarse baskets, mats, or house building or they may have served as skewers.

Bone whistles or flageolets at BN–3 were limited to the single-holed variety. There are four of these in the collection. One, B20/487, is so fragmentary that it yielded no data. The three other specimens (B41/598, pl. 15, *b*, 5; 295, pl. 23, *a*, 14; and B9/243, pl. 23, *a*, 13) vary around 17.5 cm. in length, and average 1.2 to 1.3 cm. in diameter. All are made of the ulnae of the Golden Eagle. The proximal end has been cut off squarely but close to the joint. Below this, on the convex side, a single notched hole has been cut 5.0 to 5.5 cm. from the same end. The articular distal end was broken off and perhaps smoothed casually. Apparently the proximal end was the mouthpiece. No evidence remains of pitch or other material as the stops, and, of course, they will not sound now.

These objects are rather distinctive with their single hole (sawed or notched in, not drilled) on the concave side, and the constant choice of material.

Whistles and flageolets are, of course, widespread. This short series from BN–3, certainly a tight complex as it now stands, is possibly not fully representative of those used in the area. Further work will, no doubt, enable us to certify the present complex or to enlarge it, and will give us data which may be compared with the instruments of other areas. The same type appears in the Grand Coulee area (Collier et al., 1942, pl. 9, *n*).

Bone beads of the tubular variety were rather uninteresting at 45–BN–3. Only 28 actual specimens were found. Most were broken or cracked. Two, 313 (pl. 23, *a*, 27), a simple short (5.5 cm. long×1.2 cm. thick) tube of bird bone sawed at both ends, and 719, a broken mammal bone sawed and smoothed at one end, were unassociated. The remainder were with burials. Those with burial 25 are the remnants of four beads in four fragments. They are unornamented, smoothed lengths of mammal bone. One end of each bead is broken but enough remains to enable us to measure all specimens. These range from 4.0 to 1.8 cm. in length and 5 to 9 mm. in diameter. They are slightly flattened, simple and attractive (pl. 12, *b*, 12).

A single bit of burned mammal bone showing some sawing was found with burials 12 to 14.

Two beads, broken but restored, were found with burial 1 (700, pl. 23, *a*, 26; and 176, pl. 23, *a*, 28). The former is made of a small heavy mammal bone similar to those of burial 25. It is 5 cm. long and 7 mm. in diameter and is grooved around each end and ornamented with three series of transverse cuts running the length of the bead. The second specimen is heavier, length 5.8 cm.×9 mm., also of mammal bone, deeply grooved at one end, scored at the other and has two series of transverse incisions and the beginning of a third spiraling up the barrel of the bead. The beads with burial 36 are both broken but one is measurable. This one (625) is of mammal bone, 6 cm.×1.3, and has two short series of transverse cuts near the large end. The other specimen (B36/709), also a large bead, plain, is made of bird bone.

Probably all pieces described above are beads, although No. 313 may be a short drinking tube. The group is characterized by a preference for mammal bones, simple undecorated surfaces or series of parallel, short transverse lines spiraling around or running along the barrels of the beads. Seventeen, B53/795, are of bird bone and were found together with shell beads, a beaver tooth, a copper pendant. These "beads" are probably gaming counters—as many others may be.

One comb fragment carved from mammal bone or antler was found with burial 19 (703). It is not illustrated. The piece is undecorated; the butt ends of at least four teeth are discernible.

Such objects are of course ubiquitous. The one from BN–3 is too fragmentary to warrant comparative discussion, although it was probably of the same type as shown by Krieger (1928 b, pl. 6, 7) or Smith (1903, p. 177, fig. 42).

Notched and pitted bone.—A single very badly decayed bone, presumably a single piece but now in three, was found with burial 25 (pl. 12, *b*, 17). Two of the thin elongate pieces were notched on both sides. The larger piece was grooved at the wider end and has 6 small pits on one side and 10 on the other. Apparently this deteriorated object was decorative, possibly it was a pendant. Pits as decoration are not uncommon in the Plateau (see Smith, 1900, p. 430, fig. 377; Spinden, 1908, pl. 7, 30; Cline et al., 1938, p. 188, fig. 37; Krieger, 1928 b, pls. 6, 5, 6, 9, 11, 12). It is doubtful if this piece were a die.

An antler object of unknown use is illustrated in plate 23, *a*, 16. The larger fragment (259) was found with burial 8 and the other piece (266) not far distant in the same square in this disturbed area. The whole piece is 13.5 cm.×2.4 cm.×7 mm., the holes in the large piece are conical (countersunk) from the side photographed, the two other perforations are broken. The diameters of these holes are around 5 mm.; the object is thus not an arrow wrench. In another cultural context the piece might be called a fragment of a sled runner. In this one I can only suggest its use as a handle of some type.

Antler strip.—B35/580 is a flattened pin or strip of antler. Broken at one end it is now 12.6 cm.×1.2 cm.×5 mm. The unbroken end is rounded and has obviously seen some use. It may have been, and probably was, a flaker.

Elk leg bone (?), fragmentary.—This bone, badly deteriorated, and showing no evidence of working, was found with burial 49. It is possible that it was an artifact and that decay has so altered it that no evidence remains. It may be material placed in the grave. Bits of matting (?) adhere to it.

Two bear claw cores (B25/693, pl. 12, *b*, 16) were found. Both are broken and each has two holes drilled just below the articular surface. Such objects have seen widespread use and are not distinctive although the type of stringing as suggested by the paired holes may be.

The pair of *bird talon cores* (B25/543, pl. 23, *a*, 12, and pl. 12, *b*, 9) were not drilled for suspension. They show no evidence of alteration and are probably from a large hawk or small osprey.

A *bird bill*, probably *kingfisher*, both mandibular and maxillary sections (B24/535, 536) is shown in situ just above the right clavicle in plate 23, *b*. The specimen, now fragmentary, shows no evidence of working. It was probably decorative as were the pileated woodpecker bills found at site 24 on the Upper Columbia (Collier et al., 1942, p. 92).

Ten *perforated elk canines*, nine with burial 39 (584, pl. 23, *a*, 11;

pl. 14, *b*, 7) and one unassociated (215, pl. 23, *a*, 10) were found. Most of these teeth are decayed and the holes have broken through. One tooth exhibits a double hole; the first had broken through and a second was drilled below it. Elk teeth are, of course, a very run-of-the-mill form of decoration among Indians within the range of the Wapati. Those of the Northern Plains were especially addicted to elk-tooth trim.

Beaver incisors, all fragmentary, were not rare at BN–3. Three were found with burials (B4/90, pl. 23, *a*, 17; B48/716, pl. 17, *a*, 26; and B48/676). Two (22 and 265) were unassociated. Fragments of three teeth (716, 22, 265) showed incised decorations. On 22 and 265 these were a zigzag forming a series of V's, on one side of the tooth. Item 716 was similarly decorated with parallel incisions. It is doubtful, though not improbable, that these pieces were chisels; more likely they were gaming pieces. Beaver tooth gambling pieces or dice were widely used in the Plateau. Indeed, they were a usual appurtenance of one type of game. Nearly all ethnographies mention them (see Ray, 1942, p. 183, 4043) and Culin (1907, pp. 135–136) describes the use of large rodent incisors as gaming pieces in the Plateau. An excellent series was recovered in Grand Coulee (Collier et al., 1942, pl. 10).

One *elk incisor* (B25/527, pl. 12, *b*, 14) and one *deer incisor* (B8/238) were found. Both have been notched or ringed at the root end for suspension and were no doubt used as pendants or dangles.

Eight *canines of carnivores* were collected. One pair (B48/672, pl. 17, *a*, 21) is either a large wolf or small bear. The teeth are in very poor condition, but show a few parallel transverse incisions both on the sides and near the points. Another pair of similar teeth, in much better condition, is B25/516 (pl. 12, *b*, 13). The canines are 4.2 cm. from tip to tip and 1.3 cm. wide. Both ends, root and point, have been sawed or filed off and a sparse decoration of 2 or 3 rows of short parallel incisions cover the lateral surfaces. It will be noted that this pair is neither grooved nor perforated; hence it does not seem possible that they were worn. Catalog No. B25/525 includes three large bear canines, all in an advanced state of deterioration. One of these has a fine central encircling groove. The other two do not show alteration. B25/539 (pl. 12, *b*, 10), the canine of a small carnivore, probably a fox or coyote, is grooved at the root for suspension. This was probably an ornament but the preceding bear canines were no doubt ceremonial. Burial 25, a female, had a number of these objects in her grave.

Altogether the antler and bone artifacts of BN–3 (and BN–53) do not form a full or exciting assemblage. No doubt the same conditions of soil and drainage that contributed so efficiently to the destruction of the human bones operated on the bone artifacts.

Withal, there are definite beginnings or indications of a complex here which may furnish a lever for later comparative work. The large digging-stick handles, the small and shattered wedges, single-stop whistles, the awls, the ceremonial use of claws and teeth as with burial 25, the bone beads with their simple regularity of design, and the large single-pointed pins are a few of the possible diagnostic traits of the complex as it stands now. Of no small interest and perhaps significance is the apparent use of bone to sheath iron pipestems (see under No. 44—Iron Objects, p. 103).

PAINTS AND MATERIALS

Red ocher was the most usual paint or coloring matter found. It was present in small lumps in four burials (Nos. 24, 26, 29, 39) in addition to being smeared on the effigies found with several others (see table 11, p. 66). Some scattered bits were also found in the fill. Although it is not possible to make a certain statement, the two largest lumps (B39/571, pl. 14, *b*, 11, and B26/694, pl. 15, *b*, 10) both appear to have been broken from larger lumps which were molded and hardened inside of a soft container. The ocher itself is fine, clean, and has a deep color. (Maerz and Paul, pl. 6:L:12, Indian Red.)

Green coloring was obtained from a green tuffaceous sandstone. (B36/616, pl. 14, *a*, 6, and B41/606, pl. 15, *b*, 6). The material is heavily impregnated with a green oxide of iron and when moistened is softened sufficiently to work off in large quantities. It dries to a light green (Maerz and Paul, pl. 31:E:8, Antique Green). Large quantities of this tuffaceous sandstone occur as cliffs and talus in the John Day Country (John Day Tuff).

Yellow painting, apparently, was dependent upon yellow ocher or limonite. The one lump found (B36/611, pl. 14, *a*, 9; Maerz and Paul, pl. 12:I:9, Yucatan Yellow) is fine, hard, but still contains some of the original impurities. While the red ocher appeared to have been cleaned and sifted, the limonite does not, and the green sandstone was certainly used in its natural form.

Five pieces of fine, chalky volcanic ash were found at 45–BN–3 (479 and B26/551, pl. 15, *b*, 15; B53/782, 287, 790). The first is an irregular chunk 1.5×6.0×3.0 cm., while the second is a wedge-shaped piece 7.0×2.5×1.8 cm. thick. Both might have come from deposits throughout the Plateau. The obvious suggestion is that this chalky ash was used in "cleaning" garments. Indians throughout the country are accustomed to whiten buckskin both before and after soiling by rubbing it with various kinds of white earth.

Burial 26 was accompanied by a small tabular piece of silica (548, pl. 15, *b*, 16). This material has formed, during different conditions of temperature of the rock, in cracks of the basaltic cliffs of the region. It is 6.8 cm.×5.8 cm.×2 mm. thick, and shows no evidence of artificial alteration.

THE TRADE GOODS

In general, plates 28, *a*, and 29 to 32, and figures 4 and 5 offer a good pictorial record of this facet of the BN–3 collection. Only two small glass beads were found at BN–53.

In the laboratory a vertical but telescoped reconstruction was made of BN–3 by laying out the artifacts on a grid. This technique graphically presented not only the different emphasis on trade and aboriginal goods in the living (eastern) and cemetery (western) parts of the site but also showed a compact concentration of copper, beads, etc., in the upper foot to 2 feet along the c/L and 30 lines. This points to a late and rather short period of occupation. There was some copper, and there were beads, found to the very bottom of the midden; this surely indicates an intensive single occupation and much activity, but the superficial concentration was most emphatic. The implication is that trade goods became more numerous during the life of the site.

This distribution of trade goods did not obtain in the area of the L5 line where the burials were more thickly sown—for perhaps two reasons: (1) glass beads and copper beads, and even copper pendants, appear not to have been considered suitable mortuary furnishings; (2) as objects worn and used by the living, and as objects of trade, these imports would have been lost or destroyed more often in the living area. Ironware stood on a plane apart and apparently above the rest of the trade goods. Nearly one-half of that found was with burials, while the percentage of glass and copper with the dead was small indeed.

Withal, it is to be emphasized that much the same types of iron and copper, brass of the same gages, and objects of the same types, and beads of the same varieties were found in the cemetery and the living area. The various categories of trade material have been examined by Arthur Woodward, of the Los Angeles County Museum. His remarks appear as Appendix 2.

THE HISTORICAL ASPECT

Historical documentation that is directly pertinent to our problems can be found in Marius Barbeau's "Totem Poles of the Gitksan . . ." (1929, pp. 16–24 and appendixes). Barbeau, interested in various aspects of the development of wood carving along the Northwest coast, found it useful to assemble much of the early references to the trading of European tools to the natives of the coast. I do not propose to requote his quotations, but there can be small doubt that metals,

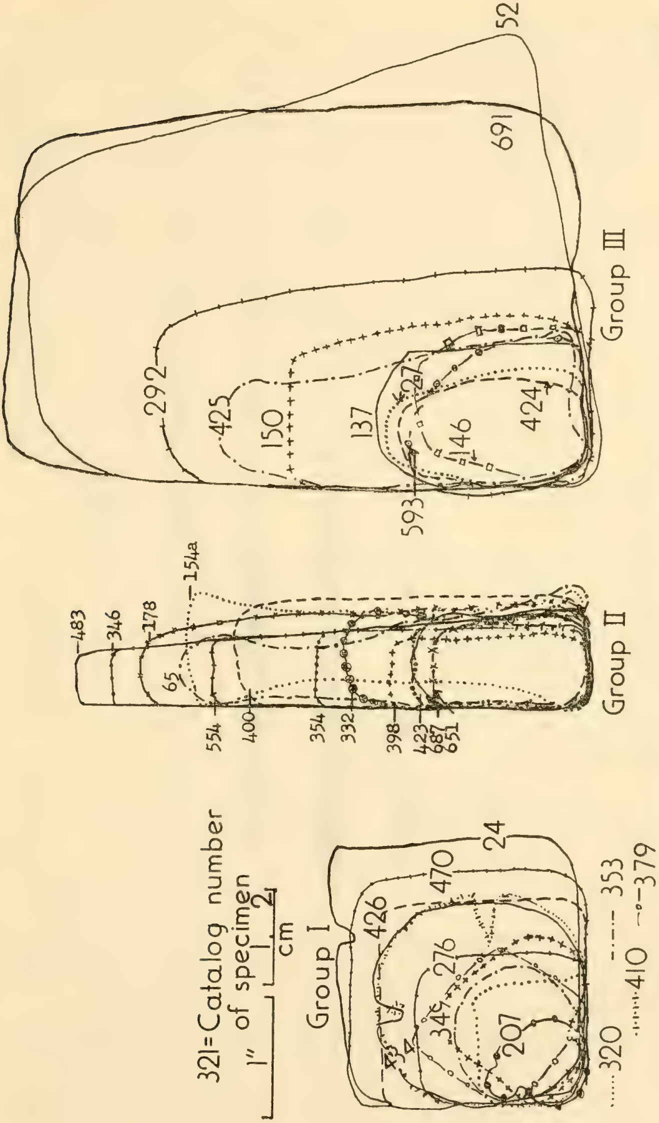
321=Catalog number
of specimen
1"
1
2
cm
Group I
24
470
426
276
349
207
33
4
320
410
353
379
Group II
483
346
178
154a
65
554
400
354
332
398
423
687
651
Group III
52
691
292
425
150
137
27
146
424
593

FIGURE 4.—Copper and brass pendants, shape distribution, 45–BN–3.

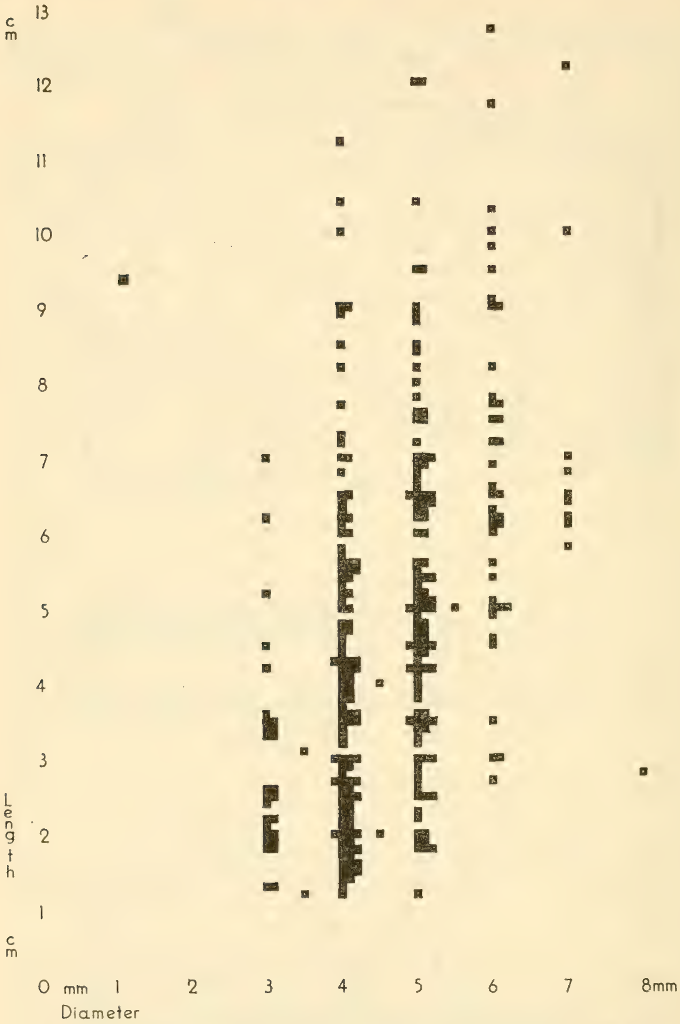

FIGURE 5.—Copper and brass beads, dimension distribution, 45–BN–3.

iron tools, copper, and brass were present in large quantities on the coast by the 1780's and 1790's. Cook (see Barbeau, 1929, p. 194) apparently believed that much of the metal was traded in by other tribes from east and north. As a matter of fact, there was, no doubt, a constant flow of all manner of trade goods from Russian, Spanish, English, and American sources into the Oregon, Washington, and British Columbia coast by the time of the American Revolution.

Coming somewhat closer to home, we note that in 1791 Captain Gray's ship, the *Columbia*, sailed up the mouth of the river that eventually bore its name (Boit, 1921, p. 1) for some distance and that the usual trading of fur for iron, copper, beads, etc., took place. All of the early records which I have examined picture the Indians as well aware of the value and uses of metal tools and ornaments. Many were well supplied (see notes on Marchand's Voyage 1790–92 in Barbeau, 1929, p. 204, etc.). In Alaska, and presumably under Russian tutelage, the Indians had learned to forge iron (Barbeau, 1929, p. 22) in the 1780's. Nowhere do we find the unsophisticated savage entranced by glistening baubles and in the first stages of learning the use of iron.

It would be interesting indeed to examine the records of shipping and trading houses in England and New England. Perhaps there are earlier and significant data contained in them. In this connection it is of value to note that the China-Hawaii-Northwest coast and England or New England trading pattern had been worked out by the 1780's. Strange (1928) was occupied in a venture of this type in 1786. China furnished cloth, tea, and a quantity of trinkets; Hawaii furnished sandlewood (and a pleasant stopover); and the American Pacific coast, furs. The home base of the ships, England or America, presumably placed iron, copper and brass, beads, etc., on the ships and took off the profits of the farflung transactions. Tied in with these ventures was the search for the Northwest Passage; this contributed to an early reconnaissance of the Northwest coast.

Just what the situation was in this early period on up the Columbia is impossible to say. We have no written records of conditions in the interior until the justly famed Lewis and Clark expedition. These observers noted large quantities of copper, brass, and glass beads in the hands of the Indians of the Snake River: "Sokulks," "Chopunnish" (Thwaites, 1905, vol. 3, p. 306), Walula-Palouse, Nez Percé, Yakima, etc. Spanish trade was then finding its way into the Nez Percé area. Iron knives were not mentioned, nor indeed were stone tools often described. The use of iron axes is mentioned for The Dalles-Cascade area (Coues, 1893, vol. 2, p. 666). I rather imagine that extensive trade, which included iron, had worked up the Columbia through the great trade mart at The Dalles. Here one of the standards of value was blue glass beads (Thwaites, 1905, vol. 3, p. 185), and the aboriginal trade of meat, robes and furs, shells, beargrass (*Xerophyllum tenax*) and fish pemmican, etc., that funneled through the trading center appears to have been accelerated by trade articles and the ready market for furs that existed at the mouth of the Columbia.

Of apparent significance is the lack of knowledge of firearms (Thwaites, 1905, vol. 3, p. 195) shown in 1805 just below the Umatilla River. Coues (1893, vol. 2, p. 647 ff.) also describes this amusing incident. Just below the Narrows, a hundred miles or so below the Umatilla area, objects of European manufacture—clothing, a saw, kettles, a cutlass, and a British musket—were seen in possession of the Indians. Presumably these Indians understood the use of the firearm. In 1811 Ross (1904, p. 137 ff.) was able to record guns, as well as great herds of horses, in the possession of the people around Walla Walla. Cox (1832, p. 118), writing of the same enterprise as Ross, lists, among other things, knives, thimbles, and hatchets as trade goods. All were found at BN–3. The speed of acculturation and the volume of trade handled at the mouth of the Columbia and carried up that stream, as indicated by the above observations, are rather remarkable. Thwaites (1905, vol. 3, p. 165) describes the extensive use of brass and iron utensils in one of the large sepulchers below The Dalles. The sepulcher on Blalock Island (Coues, 1893, vol. 2, p. 651) apparently lacked these trade items.

There is a slight possibility that Lewis and Clark have recorded evidence of trade into the Plateau from the Canadian interior and among the Nez Percé. An informant of that tribe told the explorers that at a fall on the Kooskooskee (Clearwater River) lived white people who traded white beads and brass ornaments to the Nez Percé (Coues, 1893, vol. 2, p. 606). The Nez Percé, however, were misinformed in that at that time they thought whites had established themselves at the falls of the Columbia (Coues, 1893, vol. 2, p. 610). It is very possible that the first information, given by another person, was but a twisted version of the second.

Copper Tube Beads

Krieger apparently believes (1928 b, p. 13) that the tubular copper beads, pendants, and other ornaments that he found at Wahluke were aboriginally made of native copper. Other indications also point to Wahluke as an earlier site than BN–3, and Krieger may be correct in his allegation. Certainly the rolled, tubular copper bead is not unknown in aboriginal America (see Ritchie, 1944, p. 116, Vine Valley; and Lewis and Kneberg, 1947, p. 32, Archaic, etc.). Smith (1903, p. 160) and Spinden (1908, p. 190) both note the use of native copper in the Plateau. Collier et al. (1942, p. 102) report that the tubular copper beads that they found were made of sheet metal. No doubt there was an aboriginal basis for both the use of copper (and by extension, brass and iron) and for some of the simpler techniques of metal working such as cold-hammering, filing, etc. Smith (1899, a, p. 133) states that native copper is found north of Lytton, British Columbia, in the mountains.

Plates 29, *b*; 30; and 32, *b*, should be consulted during the following discussion. Where feasible or necessary, the brass and copper sheet metal or beads are assigned the proper, approximate gages. Copper and brass are measured (gaged) in pounds per square foot. Copper: 1 square foot of copper sheeting, 0.065 inch thick, weighs 3 pounds and is 16 gage or "3 lb. copper" (Birmingham or Stubs gage). Brass is more generally measured by thickness: 16 gage brass is 0.051 inch thick and weighs 2.239 pounds per square foot (Brown and Sharpe gage). Most of the copper beads from BN–3 are of European or American (more likely the former) 26 gage (14 oz.) and 24 gage (16 oz.) and ca. 30 gage (ca. 9 oz.) hot-rolled sheet copper, possibly from kettles and from 20 gage (0.032″) brass. The various methods of cold-working metal, usually associated with a neolithic stage of culture, were employed. Plate 29, *b*, 9, and the accompanying descriptions are explanatory of the manufacture of rolled beads. Figure 5 is a scatter diagram of all copper and brass tube beads. It will be noted that there is a clustering along the vertical ordinates of each whole millimeter. Measurements in the laboratory were usually taken to the closest millimeter. Each square represents one bead. The range and clustering can be readily noted; the average bead varied around 5 cm. in length and 4 mm. in diameter. It should be pointed out that a number of these tubular beads were, apparently, killed, as were wholly aboriginal artifacts. Plate 30, Nos. 41, 42, 43, especially the latter, shows a wanton destruction, a severe denting several times along the tube, which is most easily explicable as a burial sacrifice.

Metal Pendants

The pendants are described in the captions of the plates, as is the other copper material, and are portrayed in outline by shape groups in figure 4. They were usually made of the heavier gage brass and copper. These ornamental objects fell rather readily into three groups (fig. 4); *Group I* includes the square to round; *Group II* elongate, usually tapering, rectangular to elongate rectangles with rounded corners (plus a variant, 154 a, which will be mentioned below); *Group III* is made up of larger, less elongate rectangles with rounded corners. These, like the specimens in the preceding group, often tapered toward the top where the small hole for suspension was located. It would be possible to express these groups mathematically; only a few irregular pendants would interfere with the three regularly proportioned groups.

One specimen, 154 a (pl. 30, 4), is 4 mm. thick and weighs 1½ ounces. It has been hammered into two blades or bits and the shape is roughly that of an elongate double-bitted ax. One of the ends is perforated. The object is heavy; it could easily have been hafted and would have made an excellent, light, woodworking celt.

Copper objects were decorated with short filed ticks along the edges (pendants, pl. 29, *b*, 3 and 4), drilled holes (pl. 29, *b*, 2), corrugating (pl. 30, 8, 9), bossing (pl. 30, 6, 7) and raised punch marks (pl. 30, 13, 15). The edges of all have been ground smooth. Most intriguing are the square, chisel-cut holes on such heavy objects as plate 29, *b*, 11 (butt plate of a firearm) and 17 and the rivets on 12. Of interest, too, are the conical copper objects (pl. 29, *b*, 7) (similar objects of iron were found, pl. 31, 4), the brass spoon (?) handle (pl. 29, *b*, 20), the thimble tinkler and hollow hemisphere of brass (29, *b*, 1 and 4, respectively). A few beads with one end folded back and rolled along the body of the bead were found (see Smith, 1910, fig. 74, p. 89). This was presumably an advanced technique.

Glass Beads

Glass beads were rare in the burial associations; only 10 are listed in this category. All in all, 642 beads were found. Of these about 75 percent were blue; the remainder were largely white beads with a few red, brown to black, and greenish beads. One unusual glass bead found (B46/670, pl. 29, *a*, 8) is made of flawed, translucent blue glass. Such beads were used as keepers for the draw ribbons of old Chinese spectacle cases. It is flat, 1.9 cm. long, 2.3 cm. wide × 5 mm. thick. This peculiar object may aid in outlining trade relationships and in formulating some of the chronologic relationships of the site. Only a few of the beads of this site are the tiny seed beads that became popular later. Unfortunately, even the types found at BN–3 (often called Hudson Bay beads) were made over long temporal and spatial spans. They are not good guide fossils.

Iron Objects

In contrast to much of the preceding, the objects of iron are more varied and, as tools (often of European make) rather than decorative objects, would seem to offer more hope of identification. Therefore, I will employ plate 31 as the basis for a discussion of all iron objects found. This section may then be considered a lengthy caption.

As with all other plates the number tags are 1-inch squares of coordinate paper ruled 10 to the inch. As most of the objects are fragmentary it does not appear necessary to give measurements of all pieces. Only those which merit special discussion or of which the measurements have special significance need be more thoroughly described, as to dimensions, than can be taken from the plate.

Generally the corrosion is so extensive that thickness or gages cannot be given. It has been found preferable to keep measurements of artifacts, in our catalogs, in the metric system. As previously mentioned, the plates are scaled in the English system to make available both sets of measurements. On the ironware the English system has been used, as gages, commercial descriptions, and standards, etc., do not employ the metric. The hafted iron knives are discussed under "Perishable Artifacts."

In plate 31, the following items are shown (the photo No. is given first and the catalog No. second):

1 – 62 is piece of thin iron. Both edges (inner and outer) are folded over beneath. It is obvious that the object, which is not as badly rusted as many pieces, was plated and that it served as a trim or rim of some type of fitting. It may be an intrusion.

2 – 76 is in two pieces. One of these is, as far as can be seen, simply a bit of scrap or a fragment. The other has been cataloged as a single-shouldered knife or spear point. The tang has been hammered on the edges to thicken it; the blade is thin, the point broken.

3 – B4/94 is a large, heavy, much corroded iron bracelet. Its present weight is one-fourth of a pound. All of the iron bracelets found were of this same, slip-on type. This is by far the most massive.

4 – 139 is a tinkler or an iron projectile point. A truncated triangular piece of sheet iron about 3/16-inch (0.5 mm.) thick was rolled into the pointed, conical shape. The edges meet; they do not overlap as with most of the copper. The object is hollow; no impressions of wood remain. This might indicate that the object was a tinkler rather than a point.

5 – 156 is a square hand-forged nail. It is corroded thin in several places but is in as fair condition as most of the old weathered nails that one sees.

6 – 209 is the best of three objects of its type. Although these will be mentioned as they appear, the dimensions of all three, in the metric scale, and with some discussion of the group, follow (table 16):

TABLE 16.—*Iron ferrules, 45–BN–3*

Catalog No.	Length (cm.)	Width at mouth (cm.)	Width at narrow end (cm.)	Photograph No.
209	7.5	2.5	1.2	6
B25/476	8.5	1.9	1.0	26
B32/560(4)	6.0	1.5	0.8 (hole 0.5)	34

There are two obvious theories which may explain these pieces: they are ferrules of some type of tool or they are iron tubular pieces, possibly ferrules, that were used as pipes. It was not possible to find evidence of smoking on these corroded objects. This table may be compared with that of the pipe measurements (table 7). Altogether, the ranges correspond fairly well. This may or may not be pertinent; it certainly is not conclusive. Perhaps information may be forthcoming, later, which will enable us to place these objects. It is worthy of notice that no blades of tools that ordinarily require such a ferrule (hoes, forks, small shovels, etc.) were found.

7 – 217 was a pewter pin or piece of handle (?). It was broken, the head flattened (7/16-inch wide). The object was rather well in the problematical class.

8 – B8/255 is a slender (7/10-inch wide) piece of strap iron that has been bent at a sharp angle. The straight end tapers rapidly during the last inch. Midway in the straight section is a 5/16-inch hole. The piece may be part of the trigger guard of a firearm.

9 – 289 is a fragment of a tube of rather better quality metal than most of the pieces (it has corroded less than most of the others). It is broken and slightly crushed at one end. A thread of copper, perhaps part of an inset brand or hallmark, appears on the side. The apparent conclusion is that it is part of a musket barrel. The bore is nearly ½-inch; corrosion makes accurate measurement impossible.

10 – 291 is a heavy, broad, and rapidly tapering knife or dagger-type blade. The edges are badly rusted and broken and the tip is lost but the blade is otherwise in good shape. The darkened area at the base is not a hafting remnant but is an area where the corrosion has scaled off. No evidence of hafting exists on this blade. Like all blades, it seems to have been filed from a piece of hoop or strap iron.

11 – B12–14/310 is the eye for the helve of a typical Hudson's Bay ax or hatchet. Unfortunately, the blade is gone. The eye is about ¾ inch deep and joins at the lower point.

12 – 321 is a fragment of a blade or a piece of strap iron. The longer (left) edge shows evidence of battering and a section of an edge may exist on the shorter (right) side. The piece was probably not thick but scaling makes this measurement impossible.

13 – 323 is a short piece. Both ends are square-cut and unbroken. One side (bottom in the plate) has been rolled and the object is slightly concave or dished at the left end. The object was ca. 1/16 inch thick. Reasonable conjectures as to the function of this piece are wanting.

14 – 335 is a broken flat link of a chain or is a washer or shim of that shape. Unlike No. 25, which is certainly a link, this piece is flat and thin (3/32 inch) and must, if it is part of a chain, be from a very specialized form.

15 – 338 is a large, broad fragment (ca. 3/32 inch thick). It may have been part of a saw blade; the notches in the upper surface, if they are not fortuitous breaks, seem to suggest the notches of varying depths that are typical of a heavy cross-cut saw.

16 – 342 is a long pin or slender rod bent into a loop at one end. The object is 7/32 inch thick; the lower end has been broken. A number of uses exist for such objects. The one that comes most readily to mind, in this context, is that of a ramrod.

17 – 359 is, like Nos. 4 and 19, a tinkler or conical projectile point. It is broken (the tip is gone) and is also larger than others. Unlike No. 4, the rolled edges do not meet but overlap. No fragments of wood remain in the object.

18 – 360 is a heavy spike or chisel. One end (bottom) is squarely cut and shows some battering. The other end is double beveled. In cross section it is square. It does not appear to have undergone the heavy use that a chisel of this size would see; it is probably a stockade spike.

19 – 377 is another tinkler or conical projectile point.

20 – 399 is a heavy piece of strap iron. It is bent into an L-shape; the upper edge (in the plate) is slightly thicker than the lower (3/16 inch and ⅛ inch), but this may be the result of scaled corrosion. At the bend of the L the piece is

wider and again, at the lower edge, much thinner. This drawing out indicates heating and hammering rather than cold bending.

21 – 413 is a small, thin (1/16 inch) fragment, probably of a blade or a piece of strap. It is in poor condition.

22 – 421 is a similar fragment, slightly heavier. It is not possible to tell whether or not it is a fragment of a knife but one edge (right in plate) is an original edge that could have been the back of a single-edged blade.

23 – 432 is the tongue and the base of the blade of a knife. The blade was single-edged, apparently of the "butcher" knife type. The short tongue retains one of the rivets which held the handles and has the holes of two more. This object, better metal, is less corroded (or less ancient?) than many of the other fragments.

24 – 433 is two fragments of a much deteriorated can. All that remains is part of the folded over rim. It is not improbable that this is part of a powder can.

25 – 460 is a single, broken link of a chain. The material is round in cross section except at the point of juncture (bottom, right) where both ends are beveled. The joint does not seem to have been welded, but merely pounded shut. It may, therefore, be a joining or mending link intended to be closed cold.

26 – B25/476 is an apparently conical (heavily encrusted with corrosion) ferrule or iron tubular pipe. See No. 6 and table 16 for measurements and pertinent information on this class of artifacts.

27 – B25/473 is a short, heavy (5/32 inch thick) blade, probably that of a knife. If so, it has apparently been worked and hafted after leaving the factory. There is no tongue; the base is somewhat rounded and there is a large notch on the (left) side which may have served in hafting. It would appear that the Indians worked this piece into much its present shape.

28 – 480 is three small rusted fragments. The largest may be a section of a small blade.

29 – 481 is the point of a very heavy blade of the types of No. 40 or 41.

30 – 507 is part of the flint-holding mechanism (hammer) of a flintlock gun. The upper tongue which is screwed onto the upright was not found.

31 – B25/529 is a broken, corroded iron bracelet. It is, as far as one can tell because of the thoroughly rusted nature of all these bracelets, quite similar to the others in the collection (Nos. 3, 35, and part of 32). No decorations of any kind were noted on any of the bracelets. They are all of the slip-on variety. This bracelet was definitely lighter in form and weight than was No. 3.

32 – B25/540 is a miscellaneous collection of iron fragments found with the very rich burial 25. It includes three pieces of a bracelet, some bits of scrap which are probably parts of a blade, and two pieces which are certainly iron arrowheads. The large part of the bracelet was apparently rectangular in cross section, at least along the more slender part. Breaking away the corrosion, although apt to be rather destructive to the piece, seems to indicate this. The pieces are too thoroughly corroded to show any decoration. One arrow point (pl. 32, *a*, 4) is 4.2 cm. long, 1.5 cm. wide at the base, 1.3 cm. central width, and the shape is roughly triangular with an incurving base. This point is deeply corroded and details of the outline are not as visible as they are on the second point (pl. 32, *a*, 3), which is 3.7 cm. long, 1.3 across the base, and 1 cm. central width. This is a side-notched point in every respect similar to type II b except that the basal bifurcation is not as deep as that on the stone point. It may be that the basal barbs are somewhat blunted by corrosion. The side notches are about 2 mm. deep. Points of iron became commonplace soon after contact (Coues, 1897, p. 808). In addition to the above, there are two very small frag-

ments of an iron tube; these are in every respect similar to No. 36 and reference may be made to that number for a description of them.

33 – B34/557 is two blade fragments of obviously separate pieces. Both show evidence of hafting which is of the type observed on the various stone blades. (Reference may be made to the section on "Perishable Artifacts," for a full description of the haftings of these iron blades.) They are presumably fragments of knives which the Indians have worked in their own manner. It is interesting to observe that iron was used by these people and was worked and handled by neolithic techniques. This is not, of course, an unusual observation, but it certainly indicates that objects of iron were at a premium here and that trade was not flowing heavily into the immediate area when the site was abandoned.

34 – B32/560 is composed primarily of a large knife, fragmentary, and a small iron ferrule or perhaps tubular iron pipe. Reference is again made to the descriptive matter under No. 6 for the measurements of this latter piece. It might be remarked that this piece shows less of the conical shape than do the other two already discussed. It is, furthermore, more heavily corroded. The knife, again, is an example of native techniques used on a piece of trade material. It was apparently triangular in shape, quite similar to Type Ik in outline. The base is slanted at an angle of about 12 degrees. Remnants of hafting are visible up from the base about 2 cms. Reference may again be made to the section on "Perishable Artifacts" for the scanty notes on this hafting. Suffice it to say here that it is wholly similar to that used in hafting the chipped blades.

35 – B38/562 is two bracelets so thoroughly corroded together that no attempt has been made to separate them. There is every indication that such an attempt would be disastrous and would result in the loss of such information as is available as to their form and dimensions. These bracelets are in every respect similar to those previously discussed with the sole exception that no observations can be made as to their cross section. They preserve in their limonitic corrosion bits of wood and perhaps of fabric although no evidence of stitching or weaving is present.

36 – B38/563 (also pl. 32, *a*, 5) is two long pieces of an iron tube thoroughly corroded. The same remarks as to the degree and nature of the corrosion which were made descriptive of the previous specimen may be made of this one. The diameter of the tube, as well as can be judged, was about ¼ inch (6 mm.). The hole was apparently about 1/16 inch (1.5 mm.) in diameter. This tube, before breakage, was around 19 cm. in length. It had apparently been covered by fibrous or woody material. Remnants of this material, lacking evidence of any overlapping of these fibers and showing a linear structure under the glass, are present on the piece. It would seem possible that the tube was used as a pipestem and that the covering functioned as insulation. No other theory presents itself at the moment. (See No. 44.)

37 – B29/575 is made up of a number of thoroughly corroded pieces. These were lying over the face of the burial and as a consequence bits of bone, and perhaps fabric, as well as material which may be skin or hide are adhering to or were incorporated in the corrosion. Of the seven pieces, two are simply bone with adhering corrosion, four are probably bits of a knife, and one is a small conical piece, presumably a tinkler; this object is about 4 cm. long. No other measurements can be taken because of extensive corrosion and adhering material. The largest piece appearing in the photograph is apparently the base or near basal section of a large knife.

38 – B38/601 is an ovate fragment of a knife blade. Slight evidences of what might be either hafting or perhaps organic material incorporated in the cor-

rosion are present at one end. Altogether this is typical of the iron knives which have apparently been worked by native techniques.

39 – B36/618 is a remnant of what was probably a small pendant. The material is silver. The object is small, as can be seen, and is only about 1/64 inch (0.5 mm.) thick. No perforations were noted.

40 – B44/647 is by all odds the largest blade recovered. There are, besides the four large pieces shown in the photograph, a few other fragments which are so corroded that they do not fit together. The greatest thickness, at the base of the object, is about ¼ inch (6.5 mm.). Evidences of remaining hafting can be seen. It is not known whether the irregular shape of the base was intentional (to facilitate the hafting) or whether it is the result of the breakage which destroyed the blade. Altogether it is difficult to understand why a heavy blade such as this would be so thoroughly broken unless this is attributed to destruction at the time it was placed in the grave. "Killing" of artifacts appears to have been such a usual procedure with the inhabitants of 45–BN–3 that it may be presumed that this and some of the other knives (Nos. 34 and 41) were also "killed." This blade is so long and heavy that it creates the distinct impression that it was not a simple knife, but may have been part of a dagger or even of a bayonet.

41 – B45/648 is altogether similar to the preceding but is much smaller. Corrosion has proceeded so far that it is impossible to state whether the base has been broken or not or whether the remains of organic material adhering are those of a sheath, hafting, or simply of adjacent material in the grave. This blade is again thick and heavy although, of course, much smaller than the preceding specimen.

42 – B45/674 is a large, very wide piece of a blade. It is probably a basal section and, if so, the blade was apparently ovoid with an outline similar to that of No. 27 although its size would suggest a fragment of a saw blade (No. 15). Like all pieces it is thoroughly corroded.

43 – B25a/706 is two small pieces of an iron tube in every respect similar to those with catalog Nos. 540 (No. 32) and 563 (No. 36). As a matter of fact, these two pieces, found in the laboratory while cleaning the skeletons, should probably have been associated with B25/540. Powdery ocherous corrosion remains inside.

44 – B25/707 (also pl. 32, *a*, 2) is another fragment of an iron tube. It, however, preserves for a short distance (1.5 cm.) of its length (3 cm.) a covering of bird bone (this is the opinion of the writer and of Dr. P. H. Risley, of the Biology Department of the University of Oregon, who agreed that the appearance of the object indicated that a bone sleeve covered the iron tube. No slides, however, were made of the "bone"). This lends credence to the supposition that these tubes saw use as pipestems. The bone covering may have been the mouthpiece or it may have extended for the length of the piece. It will be recalled that with No. 36 (catalog 563) evidence remained of either wrapping or of a wooden covering.

45 – B24/708 is simply a small bit of organic material thoroughly impregnated with iron corrosion. Its only interest is that it indicates that some objects of iron were included with the burial.

46 – B32/710 is a piece of iron, probably a bit of a blade, which retains a piece of split bone on one side and the impressions of a coarse-grained wood on the other. The bone and wood impressions are, of course, now part of the piece as they are incorporated in the corrosion.

47 – B23/637 is another blade apparently shaped and hafted from a piece of strap or hoop iron by native techniques. It should be noted, as an aside, that all of the blades made by the Indians have corroded extensively. This, of course,

indicates that the metal they used was not of the best and either that traders were furnishing them with poor material or that they were using metal which was not originally intended for blades. This specimen is ovoid with a rather blunt base and retains the impressions of hafting. It also had a number of small juniper seed beads adhering to one side (pl. 32, *a*, 1).

Another item, B54/794, is 16 × 3.4 wide × 0.5 cm. thick. It shows wood hafting of the usual type and may have been in a wood sheath.

Of the 48 catalog numbers which make up the collection of iron objects from 45–BN–3, 23 or almost one-half were found with burials. This included all of the bracelets, most of the large Indian-worked blades, two of the ferrules or pipes, and the iron tubes or pipestems. It does not include the hammer of a flintlock, the eye of the ax or hatchet, the spike, the links, pieces of cans, pins, etc. A few of the fragments found in the burial areas may have, at one time, been associated with burials. At any rate we are justified in concluding that knives, which were often broken, and the bracelets (two of the five bracelets were broken) were preferred grave goods. Again, about one-half of the iron was found in the eastern section, which appears to have been a living area. These pieces were, as has been noted, solitary finds of somewhat more varied material than was found with the burials. This emphasizes, again, the separation between the living area and the cemetery. With this emphasis, of course, must also go the statement that there was similar or identical material in both parts of the site. It is, of course, possible that there was a seasonal dichotomy of living and burying at the same site, but the archeology of the site offers no clue to this. We must conclude, from the iron as from a study of the other categories, that the same group lived and buried in the same area within a relatively short chronologic span.

As far as can be seen there is no correlation between sex and quantity or quality of iron grave material. Bracelets, knives, etc., were found in the graves of both sexes. More iron artifacts were found in graves of females; this fact is partially dependent upon the extensive mortuary furnishings of burial 25.

It is of definite interest to note that the inhabitants of 45–BN–3 worked their iron knives by neolithic techniques and hafted them in the same manner in which they hafted the chipped blades. It will be noted that most of these knives are ovoid with rounded, straight, or slanting bases. In the case of the strap iron piece (No. 20, 399), which shows heat treatment, it is not necessary to assume that this was worked by the Indians.

Altogether, with the exception of that included in the burials, the iron fragments found throughout the site were not at any great depth. When plotted on the profile they cluster in the upper part of the first and best midden layer. Horizontally, squares 30L1, L3, and L2 had the most unassociated specimens, in that order.

The question of the conical iron pipes (?) and the bone or wood-sheathed iron tubes (pipestems?) has not yet been solved but it, at least at present, presents interesting problems of adaptation and improvement, if not of invention. It is interesting to glance at the short notes that Putnam has written descriptive of the iron knives from late graves in southern California (in Wheeler, 1879, p. 274, pls. 15 and 14, 8). Here long knives are shown (which may have been used without hafting, although they have slanted bases). At least some of these blades were filed out of hoop iron. Although much of the southern California material is Spanish, known influence and trade from and with the North was strong.

Porcelain

Porcelain was rare at this site; this, together with the complete absence of certainly identifiable remains of such staples of the early trade as copper kettles and household utensils, the larger polychrome glass beads, etc., points toward a people living during the earlier days of Indian-carried trade, in objects of White manufacture, up the Columbia. That some of this trade may have stemmed from the interior is a hypothesis worthy of examination but one which must await both excavation and a thoroughgoing study of early trade.

The single object of porcelain is a pointed oval pendant made of a sherd which has been tentatively identified by Theodore Y. Hobby, of the Metropolitan Museum of Art: "It is very difficult to put an exact date on such small fragments but it is my opinion [that] they date from the last half of the Ming dynasty, probably of the Chia Ching period (1522–66)." This is not incompatible with what we know of the early China-northwest coast trade. Gordon Norman Wilcox, of the Los Angeles County Museum, agreed that it is a Ming piece, but placed it in the late 1600's (correspondence: Arthur Woodward).

The pendant is 4.5 cm. long; the greatest width is 2.3 cm. and the thickness is 3 mm. The background is white, the design is in the typical light blue.

Silver

Two silver objects, both probably pendants and both fragmentary, were found. One (No. 409, pl. 32, *b*, 2) was nearly circular, is concave-convex in outline, and carries parts of an impressed curvilinear design. It is thin (0.5 mm.) and was perforated near one edge. The other (B36/618, pl. 31, 39) is elongate, more extensively corroded (less pure metal), and was not drilled for suspension. It, too, is 0.5 mm. thick.

Pewter

Two pewter fragments were found. One, peculiarly, had the external appearance of iron. It was photographed with the iron (217, pl. 31, 7) and is described there. It is poor pewter (high percentage of lead) and when placed in boiling paraffin, under the assumption that it was corroded iron, it melted—to the consternation of the laboratory assistant.

The fragmentary pendant (58c, pl. 32, *b*, 5) is also pewter of a somewhat better grade. It is a small, thin sheet; the edges have been ground smooth. It is not perforated.

Buttons

Buttons were not numerous but were found in sufficient number (14 were found) to provide a series sufficiently large for study. Four types of buttons occurred. The first is a diamond-shaped, centrally pierced bit of copper sheeting (549, pl. 32, *b*, 16). It is certainly Indian made and may not be a button. A second type (pl. 30, 10 (286) and 18 (138)) is centrally embossed and has a flattened rim or flange. Both specimens of this variety are copper and both have large, single, central perforations. No information is available on them. It is doubtful if they are Indian made and I suspect, rather, that they were copper foil coverings for wood buttons. Mr. Williams, who examined the BN–3 button collection (see below), is in essential agreement with this and further suggests that their use may have been largely decorative.

The third variant is an almost hemispherical copper button (697, pl. 32, *b*, 10). It is a manufactured button of the "Alpha" type. A description is given in the caption of plate 32.

The button mentioned above, and those to follow, have been identified as "colonial" uniform buttons. They were cast and buffed by hand between 1720 and 1800. After the latter date they were replaced by machine-made buttons which carried an inscription on the rear near the shank. None of the BN–3 buttons have any date, hallmark, etc. Button experts have a number of classes or types to which they assign these colonial and early English buttons. These are generally based upon the differences in the eyelet or "English shank" and the collar which encircles it. Alpha, Trombac, and Omega are the more usual varieties. There is no need to present this classification here. Details may be found in Johnson (1948, pp. 12–13).

With the exception of the above concave-convex Alpha button, there were nine typical colonial buttons of the fourth type. All are illustrated on plate 32, *b* (3, 6, 8, 9, 11, 13, 14, 18, 19). Descriptive notes will be found with this plate. Suffice it to state here that they are all flat, circular thin buttons of copper, brass or silvery arsenic-treated brass with loop eyelets brazed on the rear. None of the famed Phoenix buttons were found by us but they are recorded from as far inland as Vantage.

Strong et al. (1930, p. 64) mentions finding buttons of brass, bronze and "a whitish metal" (no doubt arsenic-treated brass) such as "are" [sic] commonly used on uniforms. Three of the same type were recovered in Upper Columbia sites (Collier et al. 1942, p. 103). Numerous references to the use of buttons in early Plateau trade exist. The earliest is that of Lewis and Clark (Thwaites, 1905, vol. 3, p. 328).

Hermann W. Williams, of the Corcoran Gallery of Art, has kindly examined the BN-3 button collection. His comments on the individual buttons appear parenthetically on the captions of plate 32. Pertinent sections of his letters are quoted:

> The earliest-type buttons in the lot are No. 152 which is considered as falling in the 2d half of the 18th century—although it would be more conservative to say the 3d quarter; and No. 697, which is an Alpha type. This *could* be earlier, but nothing I have seen gives firm dating except that this type was not produced in the late 18th century. As it was so frail in shank construction it was replaced by stronger types. As none of the buttons have on back any inscriptions, makers' names, trade marks, etc., it is fairly safe to assume that none were made after about 1800. So the period of manufacture is bracketed by 1750–1800.

Mr. Williams sums the collection up thus: "One as early as 1750 (?), one about 1775 and the majority, 1780–1800." This lower terminal dating of the site is much closer than was expected and is, indeed, most gratifying.

Obviously, in the trade material lies the hope for most terminal dating and, as well, something of interest for the archeologist who would note the progress of acculturation in a site or area. Apparently none of the buttons could have been made and traded into the Columbia before the 1750's.

PERISHABLE ARTIFACTS

SHELLS

Although the varieties were not many, the actual quantity of shell found at BN-3 was large in comparison with the other categories. Functionally, the shell was used decoratively with only one or two exceptions: Burial 26 had several open half shells of common river mussels or unios (*Margaritifera margaritifera falcata* (Gould)), open face up, lying near it. These may have held the mussel or contained other food. Other shells, also half shells, were found with burial 18. Burial 7 had two half shells and a few pieces were found in the midden. These few instances are enough to enable us to make the statement that mussels were collected locally and rather certainly eaten (but in small quantities) and that they or their half shells as containers were offered in graves. It will be recalled that the Umatilla rapids were called Mussel Shell Rapids by Lewis and Clark because of the quantity of these shells noted along the banks (Thwaites, 1905, atlas, map 31, pt. 2, and Coues, 1893, vol. 2, p. 646).

Following are the shell finds and pertinent data; all are from 45–BN–3:

River mussel, *Margaritifera margaritifera falcata* (Gould), is found in graves and often in midden.

Olivella boetica Carpenter (BN3/B7/231): a single specimen was found. The range is from Alaska to Lower California.

Olivella biplicata (Sowerby) (pl. 24, *a* and *b*, 1) shells were the most numerous single species found. Two hundred and eighty shells were found (42 catalog numbers); 209 of these were with 10 burials. Of these 10, 5 burials had other shell or had juniper seed or bone beads. All of the burials were adults; there is no significant correlation to be found between burial type or sex and the wearing of *Olivella*.

The shells all have the tips ground away; all but a few are in a rather poor state of preservation. Many are badly stained; some are stained dark or encrusted by organic decay. The range in size is great; the smallest shells average around 1.3 cm. and the largest 2.5 cm. in length. The majority, of course, fall between these extremes. These widely spread shells were traded in from the west coast; their range is from Vancouver Island to Lower California.

Dentalium pretiosum (Sowerby) (pl. 24, *a*, 7 and 10; *b*, 2, 3, and 4; 25, *a*) was also an important shell. Two hundred and ten fragments (58 catalog numbers) or whole shells were found; 142 of these were with burials. It is not possible to state the number of actual shells represented in our *Dentalium* collection as many are largely fragmentary. All fragments were counted in the above total. There was extensive association of all shells with articles of white manufacture. Twenty-nine of the dentalia given above carried incised decorations: B/21/489, B50/403, plate 24, *b*, 2 and 3; B22/462, plate 25, *a*. These are either rows of zigzag lines or single zigzags carrying short hachures perpendicular to the midline of the zigzag. A few of the fragments have been so thoroughly ground down (Nos. 745, 754, 23, pl. 24, *b*, 4) that they are in reality small, thin-walled disk beads. Thirty-five of the 58 catalog numbers which are *Dentalium* are finds of a single broken shell, wholly unassociated, in the midden. The remainder are plural finds and/or burial associations (pl. 25, *a*, pl. 24, *a*, 10, 7). Although the zigzag and parallel hatchings are widely used *Dentalium* carvings, I have not noticed the exact counterparts of the BN–3 work in the literature.

Dentalium? (probably *pretiosum* (Sowerby)) (pl. 24, *b*, 9) was found associated with burial 42 (No. 671). Only four small pieces (the longest is 2 cm. long; the piece of the greatest diameter is 8 mm. across) were found. These shells must have been gigantic.

Haliotis kamchatkana. Seven pendants or gorgets (pl. 24, *a*, 13, 15, 16, and 17) were all found with burials. All appear to be broken or crumbled. No California *Haliotis* were identified.

Glycymeris subobsoleta (Carpenter) (pl. 24, *a*, 9, and pl. 8, *b*, 4) is represented by 108 half shells grouped under 16 catalog numbers. They are, like the dentalia and *Olivella*, trade objects from the west where they range from Puget Sound to Alaska. It will probably not be possible to trace exact trade routes, as all of these shells are widely distributed throughout the Northwest. The main routes of trade probably led up the Columbia or across the mountains and down the Yakima River. All of the *Glycymeris* have been drilled at the tip. The holes vary around 1 mm. in diameter.

This shell was not as widely distributed throughout the site as were the two preceding species. All but 3 of the 108 shells were found with burials. Burial 7 had the lion's share: 86 shells in 6 catalog numbers; burial 4 was a very poor second with 15 shells in 5 catalog numbers; burial 41 had 3 shells in 1 number; burial 25 had only 1. Both burials 7 and 25 were, it will be recalled, outstanding burials in the matter of mortuary furnishings.

The size range of the shells is not great for the bulk of the collection. The largest is 2.25 cm. in width and 2.35 in length; the smallest is 1.2 cm. and 1.3 cm. An average would be about 2 cm. for both measurements.

Disk shell (pl. 24, *a*, 3, 4, 5, 6, 11; *b*, 6, 8; pl. 24, *b*, 8) beads are so altered that identification will not be possible. Sixty-two were found, 40 of these were with burials; burial 46 had 33; burial 42, 5; and burials 39 and 27 had 1 each. All the disks with the burials except that with burial 27 were associated with trade material. All of the remaining beads were isolated single finds in the midden. They were, however, generally grouped in the area which yielded the burials.

The size range is great. The smallest (pl. 24, *a*, 5), of which there are few, are around 3 mm. in diameter and 0.3 mm. thick (No. 364); the largest are 1.6 cm. in diameter and 0.5 cm. thick. All of the 33 beads (No. 670) with burial 46 were large. In general, these large beads are less finished and less symmetrical in appearance. This may, in part, be due to decay or it may be a result of a difference in material.

There appear to be two types of the beads. One is medium to large and is less finished (No. 670) and the other ranges small to medium in size and is finely finished, symmetrical, and has a smaller, more evenly drilled hole (pl. 24, *a*, 4, 5, and 11; *b*, 8). Biconical and straight-sided holes appear in both types. Perhaps closer examination will reveal a difference in material between the two. At present, because of the large number of the first type (all large beads with burial 46, pl. 24, *a*, 3; *b*, 6), this type is almost wholly in burial association and the second is found throughout the midden in single isolated finds. In the absence of specific determinations no inferences can be drawn as to the places of origin and trade routes. The disk beads were probably used more often with other beads; pl. 24, *b*, 5, shows such an association. They are of a type not uncommon in California (Gifford, 1947, p. 94, VI a) or Washington (Collier et al., 1942, pl. 6, *k*, *l*, *m*).

Shell pendants or gorgets were not common. Only seven were found. One (No. 219) is a smoothed fragment 3.5 cm. long×8 mm.×2 mm. thick. Another (B7/244, pl. 24, *a*, 13, and pl. 8, *b*, 8) is a slender curved truncated triangle 3.9 cm.×1.2 greatest and 7 mm. least width with two holes (one of which is the natural hole of the *Haliotis* shell) at the larger and one at the smaller end (this reminds one of some of Gifford's (1947, p. 88–Q) series). It and B7/260 (pl. 24, *a*, 17; and pl. 8, *b*, 12) are *Haliotis kamchatkana.* The latter is broken but appears to have been a gorget. It is 9.5 cm. long by 1.8 cm. in width at the center hole. It has been drilled twice and one of the natural holes remaining on the fragment of the shell gives an additional point for suspension.

No. /B34/558 (pl. 24, *a*, 16) is a fragment of the unio of a large pelecypod. It has been grooved for suspension (but reminds one of A51, *a*, II, Gifford, 1947, p. 108). Two small pendants (/322, B4/88, pl. 24, *a*, 12, 14) are *Haliotis kamchatkana.* A third (B12/305, pl. 24, *a*, 15) is not identified. All are or were drilled for suspension. Only No. 88 is now in perfect condition although all of the three retain most of the iridescent nacre. Dimensions are given in table 17.

TABLE 17.—*Dimensions of shell pendants, 45–BN–3*

Specimen No.	Length (cm.)	Greatest width (cm.)	Thickness (mm.)	Shape
/322	3.0	2.35	1.0	Pointed ovoid; hole at point end.
B4/88	2.35	2.1	1.0	Diamond, asymmetrical.
B12/305	2.1	2.3	1.1	Diamond(?), asymmetrical.

One tiny pendant (No. 214) is too fragmentary to measure. It is of the above type. This type could certainly be found wherever shell ornaments are worn.

JUNIPER SEED BEADS, 45–BN–3 [3]

These small beads (/B18/555, pl. 24, *a*, 18, and *b*, 7; and burial plates) of the seeds of *Juniperus occidentalis* (identified by Miss Louisa A. Kanipe, of Oregon State College at Corvallis) were found only at 45–BN–3. They generally vary around 3 to 4 mm. in length and 3 to 3.5 mm. in thickness. In all, 12.4 feet (149 inches) of these were found with 12 burials. This does not count a foot or so that still remains with earth and matting or in similar circumstances with other artifact material which is being retained in its original condition in the laboratory. These are, of course, representative of material that has been analyzed. Burial 23 had a number near his (?) knife sheath (on a girdle?).

As these beads run about 7 to the inch, it may be estimated that the excavating crew saved 1,043 of these fragile objects. Several times this number were, no doubt, crushed during the work, were decayed beyond recognition or hope of recovery, or went unnoticed. There can be no doubt that, unit for unit, or string for string, these were the preferred or at least the most usual decoration of the inhabitants.

In general, these beads were worn around the neck. All of the finds except two (B37/631, which was found around neck and right wrist, which in turn was tucked under the chin, and the burial 23 find) were on the chest, below the chin, etc.; all are positions which indicate necklaces. Although it is not possible to be sure, the general impression is that these beads, while worn with *Olivella* and other ornaments, were not strung with these shells but appeared on a separate cord.

Following are the specimen numbers and their lengths: B25/544 (22 inches), B39/584a (30 inches), B48/661 (18 inches), B39/713 (9 inches), B37/631 (8¼ inches), B47/667 (9 inches), B36/608 (1¼ inches), B41/605 (2 inches), B45/649 (3 inches), B29/574 (2½ inches), B29/687 (2 inches), B18/555 (33 inches).

HAFTINGS

45–BN–3 yielded 5 hafted stone blades and 6 hafted iron blades (tables 18 and 19). Whereas all of the samples had wood (or, in the case of the iron knives, impregnated wood iron) adhering to the blades, only three of the stone knives (Nos. 501, 609, 664) have any wrapping remaining on the wood. All of the latter were wrapped with sinew or rawhide strips; no fibrous material was used. Of the 5 blades, the 2 shortest were angled at the base for more stable hafting (see discussion of stone blades, table 12). Only one (609, pl. 26, *a*) has any remaining wood handle extending beyond the end of the blade.

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[3] The perishable material from the two sites was all analyzed and the data organized by my wife Carolyn M. Osborne.

TABLE 18.—*Hafted stone blades, 45–BN–3*

Specimen No.	Plate No.	Length of blade	Width at base	Angle of base	Length set in haft	Wrappings
501	26, *c*	10 cm	1.8 cm	Square	4.5 cm	Bound with narrow strips of rawhide ?, 3/16 inch wide, which now extend from base of point to 1½ inches up it. Does not completely cover wood at present; wood and wrapping badly decayed.
518	26, *b*	6.1 cm	2.9 cm.-3.5 cm., maximum width.	15° slant	1.9 cm. ends at maximum width.	Wood only remaining; no wrapping; gluelike substance (cherry or blood glue ?) apparently used to set blade in handle.
609	26, *a*	12.6 cm	1.4 cm	Square	1.9 cm	Bound with ⅛-inch strips of rawhide ?; 3 rows now visible; both ends broken and no securing ties remain. Wooden handle, broken, extends 2½ inches beyond end of blade. Glue or bitumen.
664		6.7 cm	1.3-2.1 cm., maximum width	do	2.0 cm	Bound with 3-mm.-wide strips of hide; extending 5 mm. from base of wood and point; glue used.
680	21, 5	6.3 cm	3.2-3.7 cm., maximum width.	Slanted	2.3 cm	Hafted end scraper; wood and glue stain extends to maximum width which is 2.3 cm. from base. No wrapping present.

TABLE 19.—*Hafted iron blades, 45–BN–3*

Specimen No.	Plate No.	Length of blade	Width at base	Angle of base	Length set in haft	Wrappings
557a	31, 33*a*	6.6 cm	Maximum 2.4 cm., narrows to base.	Square ?	3.9 cm	Fibrous wrapping ? untwisted.
557b	31, 33*b*	6 cm	2.3 cm	Slant	3.5 cm	Fibrous wrapping visible only on edges; wooden handle shows beneath wrapping. Some fibrous wrapping above haft sheath ?
560a	31, 34	9.1 cm	2.5 cm	do	1.6 cm	Remnants of wood only; no wrapping.
637	31, 47; 32, *a*, 1	13 cm	1.8 cm.; maximum 4.0 cm.–4.3 from base.	Square	2.4 cm	Wooden handle square cut at upper end; no wrapping visible.
647	31, 40	20.5 cm. (4-fragment total).	3.0 cm	?	4.2 cm	Wooden handle only visible; fragments of organic material adhering may be remnant of sheath.
648	31, 41	11.5 cm	2.2 cm	Square		Sheath ? Fragments extend 5.7 cm. from base. No. wrapping.
794		15.2 cm	?	?	2.0 cm	3 rows untwisted fibers.

Both hafting and knives are well described by Teit (1930, p. 165) for the Coeur d'Alene. He mentions leaf-shaped blades and wood or antler handles. Only the wood handles were found at BN–3. The same author notes (1909, vol. 2, pt. 7, p. 475) that iron came to the Shuswap in the mid-18th century; it may well have come to the Columbia tribes earlier.

It is interesting to note that of the 6 iron hafted blades, 2, again, had slanted bases. Although all of the iron blades had impregnated wood adhering to the bases, only two (No. 557, *a* and *b*, pl. 31, 33) exhibited any wrapping; these were wrapped with what appeared to be a quantity of untwisted fibers. There is a possibility that this "wrapping" may actually have been remnants of a sheath, inasmuch as two other specimens (Nos. 647 and 648, pl. 31, 40, 41) were encased in fragments of fibrous sheaths. No structure of sheath weaving could be obtained. As a matter of fact, the haftings at BN–3 were no doubt similar to those shown and described by Abbott as given in Wheeler (1879, pl. 4 and text) or in Dixon (1905, p. 133).

The tables show that the same techniques were employed, by the Indians, in hafting both iron and stone blades. They were both, often, slanted basally; short sections were set into the wood, and the outlines of stone and iron blades are similar. The obvious inference is that this material refers to a period when goods of White origin were flowing through purely aboriginal channels and being adapted to native uses by native techniques.

CORDAGE AND TEXTILES

All of the cord from the sites was identified by Dr. Leroy Detling as *Apocynum* sp.: "The degree to which these [pieces of cordage] have been worked varies. In some the fibers themselves constitute almost the entire fabric; in others the fibers have not been completely separated out from the parenchymatous tissues of the stem." B. H. McLeod noted that "the individual strands of a cord [which he examined] were 0.0018 inch in diameter."

Although the bulk of the cordage (130 specimens) was preserved because of contact with copper beads (123 specimens), specimens of cord were also obtained from the juniper seed beads (2 specimens, pl. 28, *b*, 2), dentalium (2 specimens, /100 and /293), and twined matting (3 specimens). There is no difference in cordage from the various beads. The range of ply twist for the majority of the specimens (i. e., copper bead strings) includes the few specimens from vegetal beads and shell beads. Of the 130 samples of cordage examined, 95 were 2-ply S-twisted (pl. 28, *b*, 4), with degree of twist from loose to medium.[4] Only 23 samples were twisted in the opposite direction

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[4] For a discussion of this terminology, see O'Neale (1948, pp. 114–115).

(Z-twist, 2-ply) (pl. 28, *b*, 6). It is interesting, too, that of the 23 Z-twisted, 2-ply specimens of cord, only 1 of these was used in conjunction with S-twisted, 2-ply cord in stringing the same bead. The other 22 samples occurred in beads containing only their like cordage. If one can assume, and it seems likely, that one individual made the separate cords for stringing the single beads, the motor habit which produces right (Z) or left (S) twist is obviously an individually formed, but culturally controlled, one. A listing of characteristics of the cordage follows in table 20:

TABLE 20

I. Single-ply, S-twist: 6 samples.
II. Two-ply, S-twist: 95 samples.
  Two-ply, S-twist, singles Z-twist: 89 samples.
  Two-ply, S-twist, singles S-twist: 5 samples.
  Two-ply, S-twist, decayed: 1 sample.
III. Two-ply, Z-twist: 23 samples.
  Two-ply, Z-twist, singles S-twist: 23 samples.
IV. Cords of more than two single elements: 7 samples.
  S-twisted: 4 samples.
  Z-twisted: 3 samples.
V. Degree of twist:
  Hard-twisted: 8 samples.
  Medium-twisted: 45 samples.
  Loose-twisted: 70 samples.
  Very loose twisted: 3 samples.
VI. Diameter of cord:
  0.5 mm.: 6 samples.
  1.0 mm.: 52 samples.
  1.5 mm.: 31 samples.
  2.0 mm.: 9 samples.
  2.5 mm.: 4 samples.
  3.0 mm.: 2 samples.
  3.5 mm.: 1 sample.
VII. Number of cords used in stringing individual beads:
  One cord used: 35 samples.
  Two cords used: 14 samples.
  Three cords used: 10 samples.
  Four cords used: 6 samples.
  Five cords used: 2 samples.
  Six cords used: 1 sample.

A few cords (7) (pl. 28, *b*, 3 and 5) were made of more than one single spun element. However, in none of these did the final twisting involve the use of more than two plys.

It has been noted that the degree of final twisting ranged largely in the loose-medium brackets. Whether this degree of twist is directly correlated with the poor separation of *Apocynum* fiber from the tissue, which might have rendered the fiber less strong, could not be finally determined. Of the eight specimens exhibiting a hard twist, four seemed to have the fibers completely removed from tissue—three did not, one was intermediate.

The diameter of the cords ranged from 0.5 mm. to 3.5 mm., the bulk falling between 1.0 and 1.5 mm. Diameter of cord is directly correlated with the number of strings used in the beads. Specimens of 3.0 and 3.5 mm. were used single; specimens of 0.5 mm. were used in groups with larger cords in the copper beads. Both specimens from juniper seed beads were 0.5 mm. in diameter. Cords of 1.0 to 2.5 mm. in diameter were used singly, 31 times; in two's, 13 times; three's, 10 times; four's, 5 times; five's, 2 times (with .5 mm.); and six's, 1 time.

In general, there seems to have been an attempt to completely fill the copper beads with cord so as to prevent shifting (and probably, because of shifting, cord breakage). This is further borne out by the presence of a fine wooden sliver in one bead, which was of larger diameter than the stringing cords.

Tensile tests were made on four specimens with sufficient length by H. Y. Jennings, research director of Dan River Mills, Danville, Va. Results are shown in table 21.

TABLE 21.—*Cordage tensile strengths*

Cat. No.	Cordage	Tensile strength (lbs.)
12	2-ply S-twist, very loose, diam. 1.5 mm	3.81
724 (1)	2-ply S-twist	9
724 (9)	2-ply Z-twist, medium, diam. 1 mm.:	
	1st piece	4.56
	2d piece	5.31
	3d piece single ply:	
	a	2.06
	b	2.29

Inasmuch as tensile strength is bound up not only with separation-nonseparation of fiber, degree of twist, and diameter of cord but with actual preservation, the figures are not truly indicative of relative strength.

It might be noted that Smith (1900, p. 425) found both S- and Z-twisted cords associated with copper in the north.

One piece of cord (/735, one of three cords) includes a splice: plys of two cords (pl. 28, *b*, 3) were twisted in the final Z-twist. Diameter of this splice is 3 mm.; of the two-ply cord, 2 mm.

Only one other piece of cord exhibits anything out of the ordinary. No. 750 (28) is a three-strand braid made up of elements of two-ply cord (pl. 28, *b*, 1). This braid was used alone in stringing the bead.

BASKETRY CAP

This fragment (/615) was found on the skull of burial 36. It was (pl. 27, *a*) 3¼ inches long (warp) by 3 inches wide (weft), showing twining with pitch, as viewed horizontally, up to the right. The spacing of wefts is about 8 or 10 to the inch. The warp consists of bundles of *Apocynum* fiber very loosely twisted. The weft, which appears darker in the photograph, and in the specimen, is also *Apocynum.* Although the sample is very fragmentary, its position on the skull and the definite convergence of the warp bundles suggest basketry instead of matting. Burial 36 was a male, his other furniture such as one might expect to find with a male. Ethnographically, women only, with the sole exception of the Klickitat (Ray, 1942, p. 167), wore basketry caps; this leaves open three possibilities: the basket over the head of this burial was not a cap, men wore basketry caps on occasion, or burial 36 was a transvestite (or the BN–3 people were Klickitat!).

There are not sufficient data on archeological perishables, yet, to make useful a distribution study of the types found at 45–BN–3 and 45–BN–53. Those found were all good Plateau traits. When the material from cave sites begins to come in perhaps an archeological study of perishables will be more valid. It is of interest to note that the Sahaptins have been suggested as the local center of the use of the basketry hat (Haeberlin, Teit, and Roberts, 1928, p. 139), apparently on the basis of its wide use in tribes of that linguistic affiliation. Suggestions of this sort may be tested after a few more successful digging seasons.

MATTING

45–BN–53

Perishable materials from this site included only one identifiable sample.

Cat. No. 34 (housepit 11, in fire circle; Sq. 9R1, −DD 9.28) (pl. 25, *b*).

Object: matting.

Warp elements: Tule (probably *Scirpus acutus*) used in pairs, untwisted; diameter of bundle around one-half inch. Rigid warp.

Weft element: two-ply, S-twisted *Apocynum* cordage, loose; each single Z-twisted loose to medium. Diameter of cord three-sixteenth inch.

Technique: twining; pitch of stitch as viewed horizontally, up to the right. Bundles are held closely together by twining.

Spacing of weft: this fragment is 2½ inches long and exhibits only one row of twining through the center, the interval is thus at least 1¼ inches.

It is difficult to think of such rigidly tied warp elements functioning as matting, unless it were house matting.

45–BN–3

There were several pieces of twined matting—all highly fragmentary. All were associated with burials; 546 was matting covering the ribs of burial 24. That this was almost surely twined matting is shown by the bits of twisted cordage mixed in with the fiber bundles. However, the whole is almost undecipherable now as to type of twining or quantity of weft yarns. Even the warp bundles now appear in different orientation as though the whole mat had been folded or wrapped many times around the body and then compressed.

Item 583, with burial 39, adult female, lay over the chest. The warp bundles average one-eighth to three-sixteenth inch in diameter, much finer than the previous fragments of matting. The fibrous twined material appears much like the hat fragments. The tying cord seems to be single-ply cord and the interval of tying about 12 per inch (3 in ¼ inch observed).

Item 591, associated with burial 23, lay below the pelvis. This mass of fibrous material is too fragmentary and in too poor condition to reveal anything of structure. In fact, no twisted cordage was found with it, which tends to indicate that this may have been simply bundles of fiber, used to line a grave. The plank lining of the cist is clearly shown in the photograph.

Item 635 was associated with burial 33 (pl. 13, *a*), a female adult. This matting was in the bottom of the grave and half wrapped the burial. Only one row of twining was plainly visible. Cordage was two-ply, roughly one-eighth-inch diameter, S-twist, loose; each single untwisted or very loosely Z-twisted. The warp bundles were approximately one-quarter to one-half inch in diameter. The thickness of the fragment saved seems to suggest multiple folding or wrapping around the body.

Item 679 was associated with burial 49 (pl. 17, *b*), a male adult; it covered the whole body. This fragment apparently is twined matting. Bits of two-ply cordage S-twisted, with Z-twisted singles, are visible throughout the warp bundles, but the lack of quantity of cord makes detail of construction impossible to ascertain.

Two pieces may possibly have been checker-matting; i. e., over-one-under-one. In both of these (639 and 682) there was insufficient material to make identification positive. However, the decided right angle meeting of equal width strips of fiber strongly suggests matting.

The fiber covering of the lower abdominal region of burial 43 was probably a lining of unworked bark.

Item 796a, two pieces of twined matting, was found with burial 53, excavated in 1949. The upper piece had six rows of twined wefts and the warp and selvage remaining. Both warp and weft were of *Apocynum*: the warp bundles were untwisted; the single-ply weft was very loosely twisted. Bundles of *Apocynum* fibers, approximately 3 inches in width, were folded over to form the mat ends. They were secured with a heavy twined band (see pl. 27, *b*) which was probably inserted as the mat warps were laid out. The row of twining split the large warp bundles into two or three smaller warp bundles which were then maintained by the later wefts. Wefts were twined at intervals of 1¾ to 2 inches, the pitch up to the left.

Item 796b, the second fragment of matting, lay under the first. The piece recovered measured 12 inches long by 4½ inches wide and had 7 twined wefts remaining with intervals of 1¾ inches between the twined courses. This mat was much finer in size of warp bundles (approximately ¼ inch) than the first.

(No No.) With burial 54 was a very fine fragment of twined matting approximately 18 inches long by 7 inches wide. The warp bundles were less than ¼ inch in diameter and the weft was two-ply cord. Twining was pitched up to the right. The interval of weft was 2¼ inches.

One specimen (624, pl. 25, *c*) is a fragment of coiled basketry; the bundle diameter is 3 mm. with coiled stitches at intervals of 2 mm. Coiling is very fine and cuts into the adjacent bundle only slightly. Identification as to coiling was made by thoroughly paraffining the specimen and making a thin section.

ANIMAL BONES

Fitting in with the environmental picture, and serving to give it ecological depth, is the rather meager information available on the animal bones recovered. Most of them were in such fragmentary condition, as, indeed, was the human material, that exact determinations as to genus and species could not be made. Dr. Theodore White, of River Basin Surveys, made the determinations.

45-BN-53

Thirty-four separate bags of animal bones were sent for identification. Of these, 5 were from house pit 11; 8 from pit 42; 8 from 49; 1 from the back dirt of these last two pits; 1 from pit 52, 7 from 70; and 4 from the midden test.

Most of these bones were from near the hearths or in the occupational levels. In all pits the larger bones, too, following the above statement, were found near the ashy places. Pit 11 had, in order of importance, deer (*Odocoileus*), jackrabbit (*Lepus*), and dog or coyote and cottontail rabbit (*Sylvilagus*). Fish, of which the sucker was identified, were numerous. In pit 42, deer were again a more usual occurrence; cottontails were a close second; grouse, rodents followed; and fish, while numerous, were not present in the same quantity that mammal bones were. This may be the result of preservation. In pit 49, deer were first; fish and rabbits tied for second; jacks, dog or fox, pocket gopher (accidental?) and bison all tied for third place. Pit 52 had deer and rodents (small) in about the same proportion. Pit 70 again showed deer in the first place, with fish second, and rabbit, frogs, turtles, and chipmunks all in third place. In the midden, deer led, and rabbit and elk or moose (presumably the former) took last place. The most intriguing aspect of this list is the prevalence of deer. Of course, deer bones were no doubt better able to withstand the action of deteriorating agents than were fish bones, and this may well account for their position on the lists. Suckers, peculiarly, were the fish bones usually identified, but it is to be presumed that salmon made up the bulk of the others and would have been, then, more important quantitatively. Dr. Verne Ray suggests that the ritual disposal of salmon bones may have distorted the true relationships of fish and mammal bones.

The picture is one of a people who took a good many deer and some wapiti, utilized the small but numerous rodents, especially hare (jackrabbit) and cottontail extensively, and utilized fishes, among them the lowly and bony sucker. Certainly fish (salmon) would have been expected as most important in the diet, but, on the basis of the preserved remains we can only say that they were important and that salmon were not exclusive. This is in contrast to some of the published information (Ray, 1942, p. 104) where the use of suckers is denied.

Bison bones were found in only one place—in the bottom of the principal living level of house pit 49 (pls. 5, *b*, and 6 *a*, and map 5 all show these bones in situ). Only the pieces of a radius and a few central vertebrae were recovered.

45–BN–3

Here an opposite situation from 45–BN–53 occurred. Animal bones were found principally at all levels along the 30-line and in the L5 and L6 squares from 30 to 35. Bones occurred from the surface through level 5. The first level was almost twice as productive as the second and third, which were nearly equal. The fourth and fifth were, in turn, equal and had slightly less than one-half the quantity of bones found in levels 2 and 3. Counts of the number of times particular animals occurred in the identifications yielded the following: horse, 15; deer or antelope, 5; rabbit, 5; grouse, 4; rodent, 4; dog or wolf, 3; fish, 3; duck, 2; bison, 1 (level 3); frog, 1; sparrow, 1; fox, 1. The horse bones came from all levels but, as with all bones, were more numerous in the upper levels. No other segregations, either areal or in depth appeared in the bone lists except, of course, for the single finds like the bison. Again fish carry off no honors. Other than that, the contrast with 45–BN–53 is strong. Horses were obviously in use during most, if not all, of the life of the site. Hunted mammals and birds were extensively used. Horse teeth and otoliths were most prevalent; the bison bone was a cervical-neural arch.

As with the 45–BN–53 bones, I cannot see that the few bison bones are anything but in context. Bison were in Washington and Oregon during the time span of the site, although they were probably not in this area. Stevens (1855, p. 222) mentions strays or lost bulls in the Grand Coulee in the 1820's; Cox (1832, p. 141) has a few words about the rarity of the animal in the area. Teit (1930, p. 96) notes that two were killed in eastern Washington by the Couer d'Alene in 1815. Ogden (Elliot, 1910, p. 207) saw remains in southeastern Oregon. Kingston (1932) sums up the buffalo situation in the Northwest rather fully. An occasional kill, perhaps even rare bands traveling west during especially rainy and hence green years, hunters who went to the Nez Percé, from more westerly tribes, to hunt buffalo, and some trade, are logical and sufficient reasons for the presence of the few bones so far found at the McNary site.

The animal bones here, support the contention that 45–BN–3 is a later site than 45–BN–53. The presence of the horse is conclusive.

PART 2. THE ANALYSIS: INTERPRETATION AND INTEGRATION

THE COLUMBIA PLATEAU

If variety spices physiographic study as it is said to spice other forms of human activity, then the Columbia Plateau should be one of the most interesting of provinces. Contrary to our normal impression of a plateau, it is not an elevated area with a decided scarp on at least one side. This "plateau" is enclosed by mountains on all sides except the southern where it, to most students, grades from volcanic Plateau into the desert-detritus Great Basin. As a matter of fact, the Plateau was probably really a continuation of the Basin before the outpoured lavas altered its surface. It is thus largely an intermontane upland with deep drainage canyons. The elevation of this upland varies, however, from a few hundred to 5,000 feet in general, but in the extremes from some low basins of only a hundred or so feet above sea level to the Blue or Wallowa Mountains with elevations of around 10,000 feet. The surface between these extremes is as varied as that which one would expect to find between any major physiographic divisions (Freeman, 1940, pp. 12–13).

Before embarking upon a discussion of the natural landscape a few descriptive paragraphs may be interposed.

The area of the Columbia Plateau is something over 200,000 square miles—all within the United States and nearly all masked or mantled by lava. This is practically wholly drained by the Columbia River system, which in addition drains 39,000 square miles in Canada. The major tributaries include the Kootenai (Kootenay in Canada) area, 14,560 square miles in the United States; Clear Fork, 24,630 square miles (United States); Flathead, 8,600 square miles (United States); Spokane, 6,600 square miles (United States); Okanogan, 2,200 square miles (United States, plus 6,000 square miles in Canada); Chelan, 963 square miles in the United States; Wenatchee, 1,327 square miles (United States); Yakima, 5,970 square miles (United States); and the Snake, 109,000 square miles, all in the United States. These dimensions, together with a glance at the map, will give some concept of an area that is (within United States borders alone) about twice the size of France. Now that the surface has been noted in passing we may examine the subsurface.

Below the great lava flows the old surface was rough and irregular. Pre-Cambrian and/or late Paleozoic igneous, granites, gneiss and schist, with some sedimentary rocks, were controlling factors especially in northern and eastern Washington, in the Blue Mountains, etc. As far as we are concerned, and indeed as far as most of the physiography is concerned, the geology begins and ends with the mighty Miocene fissure eruptions which flooded the country (for an interesting popular account of this, see Reed, 1941) with layer upon layer of basalt. These issued generally from fissures or cracks in the surface of the earth and, being of low viscosity, flowed far and rapidly and formed nearly level or very gently sloping plains. The flows vary usually from a few to nearly 200 feet thick. The basalt issued forth upon an area of varied topography and, in spite of its masking character, the later erosion and the earlier topography have been able to vary the physiographic personality of the land. In the canyon of the Snake River, lava beds have been layered one on another to a depth of approximately 5,000 feet. There are local areas of eruptive volcanic detritus and others of erosive outwash detritus (near the mountains) and basins filled with sorted or assorted material deposited in lakes or carried into dry basins by streams and left as alluvial fans.

The surface of the Plateau has not remained static. Probably partly as a result of the extensive eruptive activity there has been a sinking of at least the surface layers in some areas. On both east and west and in the central mountainous area there has been uplift, much of it as late as the Pleistocene. The local movements of the Cascades have deformed some of the sediments in the west and the Blue Mountain uplift in the east has been fairly extensive. Most of the streams show both consequent and antecedent sections, thus reflecting the recency of much of the surface geology and physiography of the area.

Before a detailed description, I shall sketch the climatic and edaphic factors. C. Hart Merriam (1898) divides the area between Boreal (highest), Transition (intermediate in altitude), and Upper Austral (lower) life zones. Thornthwaite (1931, pl. 3) places nearly the whole of the area in his Semi-Arid climate zone with a small area of Arid in south-central Washington and bands of Dry Subhumid and Moist Subhumid on the lower and upper slopes, respectively, of the mountains or higher country to the east and west of the Columbia Plateau proper. A generalization would place the area in the dry continental steppe. This, of course, naturally does not indicate the oases areas along rivers and portions which are dependent upon ground water and which offer differing economic atmospheres to man. The winters are cold and the summers cool to hot depending largely upon altitude. For most of the region the rainfall range is from 10 to 20 inches.

The soil cover is often thin and mingled with assorted fragments of basalt, scoria, or, in the east, rhyolite and andesite. This is usual on the plateau surface away from the rivers except in the east and east-central part of the province. Near the mountains throughout the province and in basins or embayments there is often a deep local alluviation. This may be coarse throughout or well sorted. The most favorable physiographic subdivisions in the province are the result of glacial alteration of the soil cover. These are the Channeled Scablands and the Palouse hills and environs.

THE ETHNOGRAPHY

As will be shown later, ethnography and archeology in the Intermontane or Plateau province do not separate readily. Consequently, some comprehension of the type of culture extant should be offered. To that end, the following sketch of the Umatilla group is given. This was the local tribe and, while rather overly zealous in its early acceptance of Plains traits, was still a typical Columbia River-Plateau group. Map 1 (opp., p. 1) is a tribal map of the area.

Ethnographers, generally, have little concerned themselves in the Plateau with wholesale and detailed studies of material culture—the type of work which would most benefit the archeologist. This may reflect partly the extensive acculturation of local tribes and partly personal interest. There must, however, be a good deal of information awaiting study in museums, collections, etc. Perhaps the next few years will see more work in this sphere.

While I am using the word *tribe* herein, I am aware of and accept the strictures of Ray (1939, p. 112) on the usage of the word and its applicability to the situation in the Plateau. This tribal tendency was there, be it noted, and was capable of ripening rapidly under stress. Map 1 should be consulted when the following pages are read.

THE UMATILLA

This Sahaptin tribe (Ray, 1942) was located in the south-central Columbia Basin subprovince. Most of its territory lay in the central part of the Central Oregon Plateau; it included a band of 15 to 20 miles wide north of the river and extended, on the south, across toward the John Day River to the Central Mountains subprovince. The sites 45–BN–3 and 45–BN–53 are in country ascribed to the Eastern Umatilla.

A typical Columbia River salmon complex was present with the Chinook salmon, the most important single fish. Weirs were made for large fish and dams for small. Funnel traps were used. Nets of several types, including dip nets, were tied with the square knot. The use of hooks is not mentioned. Elk- or deer-bone-pointed single-headed spears, and leisters, were extensively used. Shooting with the bow was not uncommon. There was a rather weak First Salmon ceremony.

Deer, elk, antelope, bears of several species, rabbits, and beaver were hunted. Group methods such as surrounds and drives were used for the animals, such as deer or antelope, which would respond properly. Game was also stalked or run down by hunters on snowshoes. Small animals were smoked out of their holes. Bison may have ranged into the area at one time; this animal was hunted in the east by the Nez Percé after the superficial spread of Plains type culture into the Columbia Valley. Nets were used for waterfowl, rabbits, etc. Eagle blinds, disguises, decoys, and snares were supplementary techniques. Shellfish were eaten. Coyote, mink, wolf, porcupine, small and predatory birds, insects, and reptiles were considered unfit for food.

Vegetal foods were much used; camas and kouse were the most important of many root foods. Inner bark, sap, cherries, pine nuts, many berries and acorns were all used. There were some First Fruit ceremonies for both vegetal and meat foods.

Cooking was done by stone boiling in baskets and by broiling or roasting; meats and roots were both cooked in the earth oven. Pemmican was made and animal oils rendered.

Deer and elk skins, principally, were brain-cured and smoked by the women. A rib scraper was used in dehairing; the hides were grained. Tanning for robes was done with the hair on.

Coiled baskets, wooden bowls, spoons and platters, horn cups and spoons, a clamshell spoon and basketry and bark dishes together rounded out a rather full list of household utensils. Large oak mortars and small stone paint mortars are recorded. These were used with tapered stone and wood pestles. The digging stick was wood or antler handled. Horn and wood wedges were used with the "spool"-shaped stone mauls or mallets. Stone and antler adzes were both used.

Knives were of chipped stone, antler or bone hafted and wrapped with hide. A stone wood-carving knife and beaver tooth engraver were present. Sewing awls were of bone, hardwood, or horn. Fire was drilled, but flints were also used to strike sparks and ignite tinder.

Basketry was principally coiled, although twining and checkerwork were both present. Cordage was twisted or braided of rawhide, hair, *Apocynum*, and willow or cedar bark. Mats of tule or cattail were twined, or sewed with wood needles. Sewed and fur strip woven blankets were made. The flat board type cradle was used here.

A breechcloth of skin was worn in winter together with a regular Plains type of dress. Capes, robes, and ponchos of skin were used in cold weather. Men wore a fur or birdskin hat, and women the basketry hat of the Nez Percé type. This was said to have been imported—perhaps from the Nez Percé or Cayuse. Ears were pierced and there was much face painting. Ray's (1942) informants denied head flattening.

Self, sinew backed, elk rib and mountain sheep horn (spliced) bows were all used. Arrows had triple-radial feathering and were smoothed with grooved sandstone smoothers or with sand. Points were of stone, bone, or wood hardened in fire. Bird arrows, "bunts," and "poison" were used. Spears, used in war, were tipped with obsidian, flint, or slate. Slate or obsidian hafted daggers, body armor, and shields were used in war.

Shovel-nosed dugout canoes were numerous and were the only type used. Rafts saw secondary use along the river. Dogs were used with the travois and packed. One suspects this, the travois at least, as a relatively late development.

Semisubterranean houses were not recorded for the Umatilla by Ray. They lived in banked mathouses almost exclusively. These were excavated about 2 feet, had rounded ends, and were up to 60 feet long by 16 feet wide. The double ridgepole was used and several fires, one for each two families, seem to have been the rule. Conical mat lodges, ramadas, and drying and storage structures and sweat lodges of the Plains type complete the architectural forms.

Games and recreations included shinny, wrestling, hoop and arrow, hoop and pole, dice games with flat bone pieces, and the hand game. Beaver teeth dice were not mentioned in the sources consulted. Buzzers, the bull roarer, the single headed drum, whistles, flutes (used in courting), and rattles were all musical instruments in use by the Umatilla.

Tobacco was smoked with kinnikinnick in trumpet-shaped tubular and elbow soapstone pipes.

Girls were isolated at menarche in either summer or winter in the menstrual hut. Training and taboos were moderate. Subsequent menstrual periods, too, were times of isolation. There was no ceremonial recognition of male pubescence. Residence was patrilocal.

After death the corpse was washed, its face was painted, new clothing was put on, and it was decorated. A tight shrouding of the extended body, with arms on the chest, followed. Burial was in the earth or rocks along the river or on an island, but not, apparently, at the villages. The corpse was placed on its back with the head to the west; the grave was lined with hide or withes.

War was for protection, revenge, or plunder. Raids were made, coups counted, and scalps taken. Few slaves were taken. The later war complex was largely that of the Plains.

Political organization was tribal, and chieftainship was on the basis of achievement—usually in war. Rank in general followed a man's rank as a warrior.

The Guardian Spirit was sought during the years just before puberty and shortly after, although the spirit who chose one as its ward might appear in a dream or vision at any time of life. The Winter Guardian Spirit Dance was celebrated.

Shamans followed the same quests as other persons; their spirits were either stronger or were specialized. Women shamans were as powerful as men. Illness, caused by an intrusive spirit or object, or soul loss, was cured by sucking, smoking, or dancing. Malignant shamans or malignant acts by shamans were common.

TRIBES AND THE NATURAL LANDSCAPE

In his "Cultural and Natural Areas of Native North America," Kroeber (1939) has attacked, among others, the anthropogeographic problem of the accordance of natural boundaries and those of ethnic groups, and the reasons thereof. I do not propose to add, here, to his clear sketch of the difficulties involved (Kroeber, 1939, p. 201 ff.) or the reasons why geology and geography are so often masked that culture is no longer sensitive to their differences. I should like to echo, however, his statement that settlement maps are of greater value for this work than the various more generalized ethnic maps to which we are accustomed. Fortunately Verne F. Ray has located a number of native villages in the Plateau and this has been one of his bases for drawing the tribal maps upon which it has been necessary to lean heavily in making tribal map 1 (opp., p. 1).

Ray's work, backed by others as it is (Ray et al., 1938) and in close agreement with Spier (1936), has appeared to be the best for the present purpose. Consequently his tribal maps have been superimposed, with little in the way of personal judgment, upon the physiographic map as worked out by Freeman (1945) and others. The results of these two workers, men laboring in fields far apart, show some interesting accordances which are well worth mentioning. These, copied onto the excellent map drawn by Erwin Raisz, and considered together with climatic and vegetational factors, cannot help but deepen our understanding of Plateau culture.

This study is thus almost wholly dependent upon the ethnographers and physiographers whose results are being used. One cannot hope to even spot-check their conclusions. Science has become too ramified for the individual worker to explore each plank that he uses in his own particular structure. Furthermore, it would seem impertinent to insert here a pro and con seesaw of discussion of the physiographer's results—Fenneman, Loebeck, Freeman, and others—or of the ethnographer's—Berreman, Boas, Teit, Spier, Ray, and others. Consequently the unaltered results of these latest local workers have been accepted. The accord that is found in their delineations, the reasonableness of their results, incline one to further faith in the general accuracy of the sources chosen.

In only a few places has a conscious hand been taken in the map drawing. It has not always been possible to follow the tribal outlines with the same degree of exactitude as the physiographic. As a reflection of this, note Ray's (1936) hatching method of showing tribal boundaries. This is, of course, implicit in the nature of the material. As a consequence, however, there has often been some choice in my mapping. Where a tribal boundary lay somewhat near the crest of a range, a rim, a marked erosional, or some such geographic break in continuity, it has usually seemed best to put the tribal boundary on the crest of the ranges, the ridges, etc. This is probably wholly defensible and should give results both more significant and more correct. It hardly need be stated that the tribal map represents the data of a single, archeologically speaking, chronological level. Had we a tribal map of three centuries ago it would no doubt be entirely different and would probably show differing agreements and disagreements with the more immutable physiographic map. These changes should be culturally, politically, and economically explicable just as the present boundary relationships should be.

The word "boundary" is used here in the sense of a march or band. No line of demarcation existed; rather an area where both of the adjacent groups mingled freely in times of peace (the usual situation) or entered hesitantly in times of war, formed the frontier.

With the above in mind, we may proceed with an examination of the correspondence (which will interest us particularly) or lack thereof, between the ethnic and physiographic units of the Plateau. This section thus provides a review of both. I shall begin with an examination of the Southern Okanogan in the Northwest. Constant reference will be made to map 1. The tribe mentioned ranges principally in a small rincon of the northern Rockies. It can be seen, however, that the eastern two-thirds of its range is lacking the extreme relief of the western third. It is more plateaulike. In addition, Southern Okanogan country crosses the physiographic boundary at the north of Omak Plateau and extends to just south of the Columbia River. As a matter of fact, it will be shown later that the call of the central plateaus and plains of the Columbia Basin was great enough to cause most of the primarily mountain tribes to expand into it to some extent. An exception to this appears in the case of the Methow, Chelan, and Wenatchi who, with the partial exception of the latter, conformed on their eastern boundaries to the physiographic boundary between the northern Cascades and the Columbia Basin. Their western limit was, roughly, the divide along the Cascade summit. Internally their ranges were limited by the southeast trending drainage lines. When it is recalled that these tribes (together with part of the Southern Okanogan, Kittitas, Klickitat and Western Yakima) lived in the north-south band of humid Western Pine Forest, the correspondence of vegetational, climatic, and ethnic types is remarkable. The Columbia River, their eastern and a physiographic boundary, apparently acted simultaneously as a lure and stop signal. The tribes in question seem not to have penetrated far beyond it.

Both Kittitas and Yakima lay astride the western physiographic boundary. The Klickitat expanded south into the Willamette in the early 19th century but were forced back into what is essentially the area given in map 1. The western march of the two former tribes lay somewhere in the region of the Cascade Divide. Although the Yakima southern boundary (with Tenino and Umatilla) does run somewhere near the crests of the Simcoe Mountains and Horse Heaven Hills, there is no further physiographic control exercised on their range with the exception of the major part of the northern boundary of the Wanapam (with the Columbia). Here this ethnic division is also a physiographic one (between Yakima Folds and Central Plains sections) in the complex area of the Saddle Mountains and Frenchman Hills.

It has been mentioned that the mountain tribes always appear to have attempted to include in their range part of the plateau and plains sections of the Columbia Basin. The reverse is also true. Not only did the Sanpoil and Nespelem stand athwart the physiographic line between the northern Rockies and Columbia Plateau so that the southern one-fourth of their range was about equally divided between Channeled Scablands and Waterville Plateau but the Spokan also ranged north across the same river so that the northern third of their country lay out of the Columbia Plateau and in the northern Rockies.

North and northeast of the tribes mentioned in the last paragraph are the Colville, Lakes, Chewelah, Kalispel, and Kutenai, all of whom are entirely within the northern Rockies. Of these the Kalispel groups ranged well up the Clark Fork River. The Coeur d'Alene provided an interesting case. Their eastern boundaries are, in the main, the crests of various ranges. On the southwest they have roughly followed the very irregular division between the Tri-State Uplands section and the northern Rockies. On the west they range beyond the physiographic boundary into the Palouse Hills section of the Columbia Plateau. This is the same advance of an ethnic frontier for a short distance across a physiographic one that we have noted before.

The Spokan and Columbia virtually monopolize, with the exception noted above, the northern parts of the Columbia Basin subprovince. Their northern, eastern, and western boundaries have been discussed. On the south there is no physiographic and ethnic correlation with the exception of the Wanapam-Columbia boundary mentioned. Strangely, the Spokan-Columbia dividing line is in every respect of form and direction similar to the Channeled Scablands and Central Plains-Waterville Plateau boundary but it lies zero to 30 miles east of it. There appears to be environmental reason for this other than the fact that Russell (1931, map) draws his line between cold desert with dry summer (BWks) and cold steppe with dry summer (BSks) somewhere along in the same general area. Perhaps the boundary is fortuitous. It certainly was fluid so far as tribal movements went.

The confluence area of the Snake and Columbia Rivers is one of tribal and geographic complexity. Here no less than six physiographic sections may be found within a radius of slightly over 40 miles from the point where the two great rivers converge. Six (or seven, if we may count the Palus) tribes or subtribes have parts of their ranges within this same radius. The correlation goes farther; the region where the Horse Heaven Hills cross the Columbia, forming the Walula Gateway, is one of extreme physiographic complexity. Boundaries between three physiographic sections lie, here, within a space of less than 10 miles. Here, too, the Umatilla, Cayuse, Walula, and Yakima boundaries, as they are currently mapped, are very close, indeed. There is no intention of going over these lines on the map in detail, mile by mile, but it should be pointed out that there are places where the accord may be greater than drawn. One of these is the Umatilla-Walula dividing line along the Horse Heaven Hills. Here, as stated previously, it has seemed fit to consider the crest of this part of the range a more suitable ethnic boundary than the slope. The physiographic line lies a few miles to the north on the northern slope. We are fortunate in that the major archeological activities of River

Basin Surveys in the Columbia drainage will be in this area of meeting of numerous tribes and physiographic sections. It is interesting to note that Hale was strongly impressed by the linguistic diversity of this cosmopolitan area (Wilkes, 1845, vol. 4, pp. 467–468).

Exact border and physiographic correspondence occurs along the Walula-Palus boundary (the Snake River) and the Walula-Cayuse boundary (between the Palouse Hills and the Central Plains). Ethnically the latter, at least, was not too important. The Cayuse and Walula are known to have intermingled very freely. On the eastern Umatilla boundary between that tribe and the Cayuse the same probably obtained. Here the tribal line follows a fraction of the North Central Oregon Plateau-Central Plains boundary. This, again, was far from a hard and fast tribal division.

It is obvious here that most of the tribes concerned have striven to secure footholds on both sides of the rivers. This is especially noticeable in the case of the Tenino and Umatilla whose northern reaches, previously mentioned, give them territory on both banks of the Columbia. The reasons for this are probably partly military and partly ecologic and economic.

The Molale (or Molala) and Tenino southern extensions are questionable and there is no intention of attempting to pin them down here (Murdock in Ray et al., 1938, p. 396). Consequently, after having pointed out that the Wishram-Tenino (Molale?) boundary, as it is drawn, lies close to that of the Cascade-Columbia Plateaus along an east-west line, this part of the discussion may be left.

While the western Umatilla border seems to be along or just west of the Rock Creek Valley and, consequently, fits no important physiographic dividing line, this tribe's southern extension stops at the physiographic line between the North Central Oregon Plateau and the Blue Mountain sections.

The Cayuse and Nez Percé ranges are enormous. The outline of that of the former tribe corresponds to physical sectional divisions in three places. Two of these have been mentioned: the Walula-Cayuse and the Umatilla-Cayuse zones of meeting. On the east there is a short space where the Cayuse-Nez Percé boundary falls in with that dividing the northern prolongation of the Blue Mountains from the Tri-State Uplands.

The southeastern Cayuse-Nez Percé dividing line, and that separating the southwestern part of the Nez Percé range from that of the Northern Paiute, does not follow the physiographic boundary but loops south between two of these (Tri-State Upland—Wallowa; Seven Devils and Wallowa; Seven Devils and Blue Mountains divisions) and then heads east toward the Bitterroot Mountains. Here there may be a problem similar to the one concerning the Spokan and Columbia march. There can be no doubt, again, that the important division between arid and semiarid climates and between dry western pine forests and Great Basin semidesert or grasslands ran here somewhere very near both tribal and physiographic frontiers. This may have had greater influence on tribal settlement than the purely geographic-geologic considerations—and probably did. Unfortunately, the maps available do not permit drawing this climatic-vegetational line with exactitude, even if the data themselves did allow an exact map to be made—which is doubtful. At any rate, the present conclusion is that we are observing here the same phenomenon that has been noted over and over again; a tribe or group, at least here in the Plateau, will always attempt to extend its range out of the land type that makes up most of this range into an area differing strongly physiographically or in ecologic potential. This is explicable, as it should be from the anthropologist's viewpoint, on the grounds of or as a corollary of Plateau culture. Here, as will be recalled from the ethnologic review, hunting, fishing, and gathering techniques yield the food supply and transhumanic existence is the result. This seasonal round of varying economic activities usually calls for the seasonal exploitation of entirely different ecologic areas; hence what has been interpreted here as an attempt of rather large groups to share in diverse areas. It would be of interest to survey peoples on a similar cultural level for a much larger area to see if this principle obtains further. No doubt the desire to share in valuable and diverse lands was at the bottom of the previously mentioned knot of tribes around the Snake-Columbia confluence.

As one leaves the Plateau and moves either south or north, one leaves the area of small physiographic sections or tribes and of intensive study of the former. Our present interest stops at the Plateau borders, but it may be of value to note that in the southern part of the Columbia Plateau there appears to be one more ethnophysiographic border conformity. Here the boundary that Stewart (1941, map 1) has drawn to divide Northern Paiute and Shoshoni realms follows that separating the Wallowa-Seven Devils from this part of the northern Rockies.

In summing up, it can be stated that physiographic, climatic, or vegetational frontiers have shown themselves to be closely related to ethnic ones in many places in the Plateau. Again, in many places where this correspondence was moderately close, the results have been predictable, given the Plateau-type culture.

EARLY CONTACTS

Pending a thorough archeological-historical survey of the McNary Reservoir as a whole, or better yet of the Upper Columbia and Snake

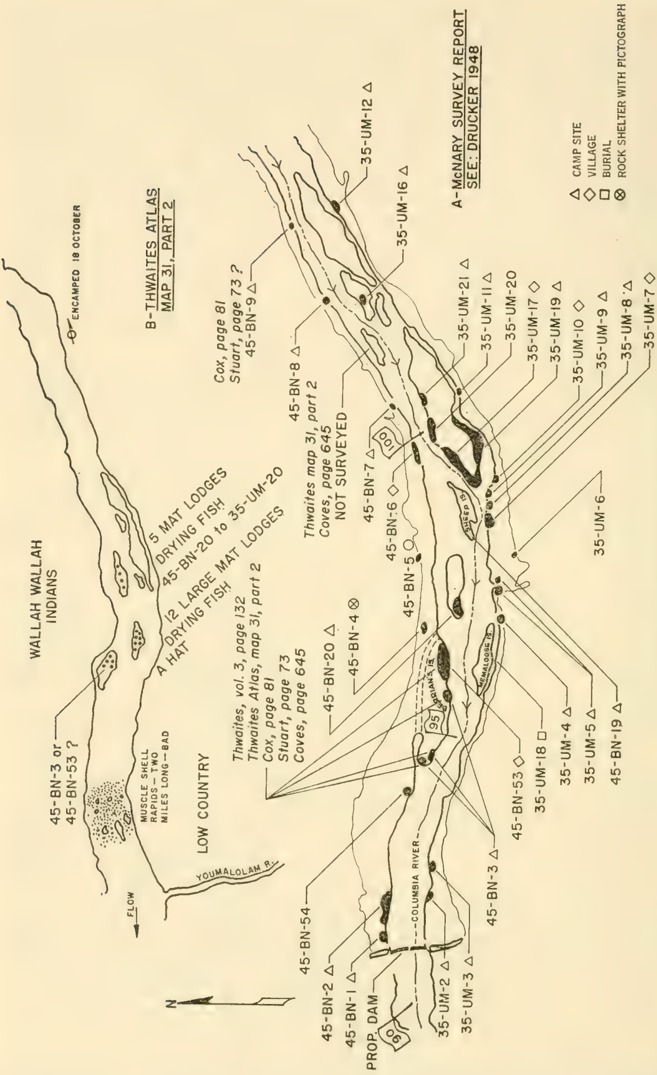
River area as a whole, there is not much to be gained by an extensive presentation of all of the historical references to Indian encampments or villages along the Snake-Columbia to Umatilla. This information has been compiled and is, as far as is known, complete. This compilation is, of course, bulky and is not intended for incorporation, in toto, into any study. Rather, it will find its most important function in further investigation in the field. It is hoped to use this abstract of earlier traveler's journals and narratives from the river itself and from convenient vantage points, to bring historical narrative and the archeological survey into as close concordance as information will permit. There will be presented here only such references as appear to concern the two sites under discussion. Even these references are beset with uncertainty but will, it is hoped, be clarified in some of their aspects after fieldwork.

Thwaites' "Original Journals of the Lewis and Clark Expedition, 1804–1806": 18th October: "14 miles to a rock in a Lar^d resembling a hat [now Hat Rock] just below a rapid at the lower point of an Island in the Middle of the river 7 Lodges [45–BN–20, McNary?] and opposite the head of one on the Star^d side 5 Lodges [45–BN–3 or 45–BN–53, McNary?]. Lar^d passd an Isl^d in the middle at 8 miles on which 5 Indian Lodges, deserted." [35–UM–17 to –21, McNary?] (Thwaites, 1905, vol. 3, p. 132; see also atlas, map 31, pt. 2.)

Stuart's "Narratives of Overland Trip Eastward from Astoria in 1812–13": Friday 24 (July 1812): "Camped opposite the Umatulla River" (Stuart, 1935, p. 61). "This day we found intolerably hot and after coming 15 miles stopped at an Indian Village [79] where traded 4 horses . . . ." Footnote 79 places this village on the north bank (Stuart, 1935, p. 73). This is almost indubitably 45–BN–6.

Cox's "Adventures on the Columbia River" (Cox accompanied Stuart on the trip mentioned above): "Up river ½ day from the rocky island stopped at village. There purchased horses." (Cox, 1832, p. 81.)

There is a fair possibility that the Lewis and Clark reference is to 45–BN–3 or 45–BN–53. The Stuart and Cox party, passing on land and apparently along the north bank only 8 years later, does not note a village until 15 miles above the Umatilla River, one-half of the way from that river to the Walla Walla River. It is, of course, possible that they may have passed an inhabited place without mention and it is also possible that the 15 miles was an overestimate and that they traded for horses at 45–BN–3 rather than farther along, as I believe. Unfortunately, no other notes are as full as those of Lewis and Clark. Be this as it may, my present inclination is to infer from the references that neither 45–BN–3 nor 45–BN–53 were flourishing villages in 1812—if they were inhabited at all. There is even some


A-McNARY SURVEY REPORT
SEE: DRUCKER 1948
B-THWAITES ATLAS
MAP 31, PART 2
△ CAMP SITE
◇ VILLAGE
□ BURIAL
⊗ ROCK SHELTER WITH PICTOGRAPH
ENCAMPED 18 OCTOBER
WALLAH WALLAH
INDIANS
5 MAT LODGES
DRYING FISH
45-BN-20 to 35-UM-20
12 LARGE MAT LODGES
DRYING FISH
A HAT
45-BN-3 or
45-BN-53 ?
MUSCLE SHELL
RAPIDS – TWO
MILES LONG – BAD
LOW COUNTRY
YOUMALOLAM R.
FLOW
N
Cox, page 81
Stuart, page 73 ?
45-BN-9 △
45-BN-8 △
Thwaites map 31, part 2
Coves, page 645
NOT SURVEYED
45-BN-7 △
45-BN-6 ◇
45-BN-5 ○
45-BN-4 ⊗
45-BN-20 △
Thwaites, vol. 3, page 132
Thwaites Atlas, map 31, part 2
Cox, page 81
Stuart, page 73
Coves, page 645
35-UM-12 △
35-UM-16 △
35-UM-21 △
35-UM-11 △
35-UM-20
35-UM-17 ◇
35-UM-19 △
35-UM-10 ◇
35-UM-9 △
35-UM-8 △
35-UM-7 ◇
35-UM-6
SHEEP IS.
NEMALOOSE IS.
INDIANS IS.
100
95
35-UM-4 △
35-UM-5 △
45-BN-19 △
35-UM-18 □
45-BN-53 ◇
45-BN-3 △
45-BN-54
COLUMBIA RIVER
45-BN-2 △
45-BN-1 △
PROP. DAM
35-UM-2 △
35-UM-3 △

MAP 9.—Historical references.

doubt if they were inhabited (or observed) in 1805 when the Lewis and Clark expedition went down the Columbia.

Map 9, *a* and *b*, is a tracing of the pertinent sections of the archeological maps of McNary and of map 31, part 2, of Thwaites' Lewis and Clark atlas. It will be noted that the island with the five lodges (*b*), which is possibly 45–BN–3 or 45–BN–53, is completely cut off from the mainland by a subsidiary channel. Sites 45–BN–3 and 45–BN–53 are on a double island of the same general shape. An old channel existed between the mainland and the land on which the sites are found. It is now rather well filled. A low, wide, sandy swale halves the island at present.

The 14 miles from the camp of "18 October" places the party in the neighborhood under discussion; the hatrock is in its proper place and is still known by that name. If the island close to the starboard (north) side of the river is not Berrian's Island, then the five lodges may be 45–BN–20—although that site is not on the head of the island. In that event the island in the middle of the river with the seven lodges may be 45–BN–19 (Sheep Island) or a site on the large island (35–UM–17, –19, –20, or –21). In the latter event the 8-mile island could easily be 35–UM–16. These conjectures are not, at the present stage of our work, particularly fruitful. It is to be hoped that further fieldwork will clear up or cast some light on the problems. Similar problems have been encountered throughout the length of the area examined and it is to be anticipated that some will yield to our study.

SCIENTIFIC INQUIRY IN THE PLATEAU

MODERN ANTHROPOLOGY

Of the ethnologic works that have been printed, and have been found helpful, Teit's "Salishan Tribes of the Western Plateaus" (Teit, 1930), to a lesser extent his "Middle Columbia Salish" (Teit, 1928); Cline's et al., "The Sinkaitek or Southern Okanogan" (Cline et al., 1938); Ray's "Cultural Relations in the Plateau of Northwestern America" (Ray, 1939), "The Sanpoil and Nespelem" (Ray, 1933), and "Culture Element Distributions": XXII, Plateau" (Ray, 1942) are outstanding. The latter work and ethnologic approach is certainly "made for" the archeologist who is trying to bridge the gap between his site and an ethnologic village or culture—as Berreman has shown (Berreman, 1944).

Earlier digests of still older information such as Lewis' (1906) have been useful and will probably be more so when the program of excavation, and consequently of study, is further along than at present. By the same token the accounts of explorers, trappers, and traders, which certainly do not fall under the heading of Modern Anthropology, are nevertheless linked to it by the chain of information that they provide, and are often most useful.

EARLY RECORDS

These earlier "anthropological works," works that were anthropological in actuality though perhaps more demographic in intent, are rather effectively portrayed in action in the previous section (p. 131 ff.) in which the notes of Lewis and Clark, and other early travelers of the Plateau, have been geared as far as was possible with the work done by the Columbia Basin Archeological Survey. This same work is to be done, and has, as a matter of fact, been initiated, for other reservoir areas in the Plateau.

It is indeed fortunate that the earliest record is by all odds the best. The Lewis and Clark journals have no parallel. Mackenzie, though earlier, did not cover that portion of the Plateau with which we are now concerned. The same may be said of Fraser and Harmon—the latter an excellent recorder. Thompson and Henry, trader explorers (Coues, 1897), give more ethnologic and demographic information. The Astor expeditions resulted in a number of journals most of which have been found valuable for some local area. Franchere, Cox, Ross (an observer of the type of Harmon) have described the Indians among whom they have traded or lived. Irving's writings are, of course, compilations. The 1820's and 1830's bristle with company men and independent traders who have left chronicles. Some of these, like Wyeth, had naturalists along for part of their journeys. The ethnological use of this material is one of laborious sifting and compiling, enlivened truly by the interesting narratives.

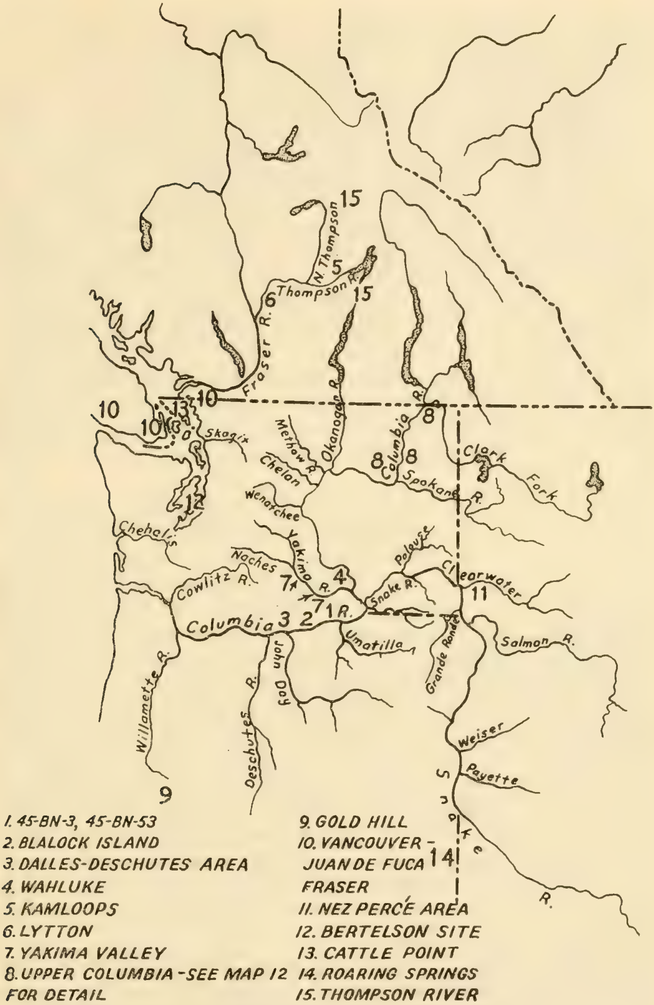
The missionary period begins in the 1830's, and among the men of God who have recorded Indian "lore," Parker, DeSmet, and his fellow workers are of the greatest value. Others are definitely in secondary place.

Wilkes' remarkable expedition and the travels of the publicity-minded Fremont preceded the railroad surveys. The report of the former has been most useful. With the arrival of the streams of settlers who followed the Oregon Trail, and the many Government surveyers, soldiers, and administrators, we leave the period from which we can expect to gain much eyewitness information on our archeological sites.

ARCHEOLOGICAL WORK IN THE PLATEAU

(Map 10)

In conformity with the remarks made in the Introduction, it is not the present purpose to explore and record here all of the collecting and excavation done in what is called the Plateau. This would not be an


15
N. Thompson
5
Thompson R.
15
6
Fraser R.
10
10
13
10
13
Skagit
Methow R.
Chelan
Okanogan R.
Columbia R.
8
8
8
Clark Fork
Spokane R.
Wenatchee
12
Chehalis
Yakima R.
Naches
Palouse
Clearwater
11
4
Cowlitz R.
7
7
Snake R.
1 R.
Columbia 3 2
Umatilla
Grande Ronde
Salmon R.
John Day
Willamette R.
Deschutes R.
Weiser
Payette
Snake R.
9
14
1. 45-BN-3, 45-BN-53
2. BLALOCK ISLAND
3. DALLES-DESCHUTES AREA
4. WAHLUKE
5. KAMLOOPS
6. LYTTON
7. YAKIMA VALLEY
8. UPPER COLUMBIA - SEE MAP 12 FOR DETAIL
9. GOLD HILL
10. VANCOUVER - JUAN DE FUCA FRASER
11. NEZ PERCÉ AREA
12. BERTELSON SITE
13. CATTLE POINT
14. ROARING SPRINGS
15. THOMPSON RIVER

Map 10.—Site locations.

extensive project as archeology in this section of the country has been rare, and rarer still have been archeological reports. Local collectors, on the other hand, have been active indeed. The often spectacular artifacts have lured pothunters from rock-covered talus burials to cemeteries on islands in the big river, and the furrow that they have plowed through the archeological record will never be closed.

Truly it is a matter of eternal surprise that one so often hears in supposedly informed anthropological circles the statement that ethnographic study is now the prime necessity and that anthropological minds and funds should be channeled into it, rather than into archeology, before the deaths of informants and cultures have wiped away the last chances for recording. While not intending to belittle one whit the urgency of ethnologic investigations among the many tribal remnants within the borders of the United States alone, I submit that the eager and excited collector is unwittingly playing a part in expunging the scientific record which is little, if at all, behind that of the Grim Reaper. In all fairness it must be stated that there is a vast difference between collectors and the commercial digger. Work of the collector can be useful to the scientist, as anyone who has examined collections while on survey knows (see Seaman, 1946), but it is doubtful if this aid can ever compensate for the churned and ruined site left behind.

It seems wise, in lieu of a history of archeological progress on the Plateau, to give a short description of the work done by various students in the area and, in this manner, to note a few of the problems that have arisen. Many persons have written short descriptive articles of varying value. Some are archeological, but many, primarily ethnographic, have brought facets of information together into a form usable to the archeologist. Among the more important are the works of Lewis (1906), Ray (1942), Teit (1930), Cline et al. (1938). I am aware of only two fairly recent studies in which there has been an attempt to synthesize the results of archeological work in the Plateau. One of these, Heizer's (1941) is limited to a discussion of Oregon prehistory. The other is a short synthesis appearing in Martin, Quimby, and Collier (1947). Heizer's, older, is limited in areal scope and is, consequently, of more local value. Its excellent bibliography should be a starting point for any bibliography of Plateau anthropology. Martin et al. have gleaned all meat possible from the archeological reports and have presented it, successfully, in a form intended to facilitate its use as a text.

Of course, extensive use has been made of the meager data that have been gleaned on Plateau archeology in reports with a much broader scope. These range from specific studies such as Waterman et al. (1921) to broader interpretations like that of de Laguna (1947).

L. S. Cressman has been the most recent consistent worker in the archeology of the Pacific Northwest. Much of his work, however, has been on peripheries of the Plateau proper. He covered the State of

Oregon on a survey of petroglyphs (1937), published the final results of his excavations in southwestern Oregon in 1933, and in the later 1930's worked extensively in southeastern Oregon—in the Northern Great Basin. From this came several publications (1936, 1940) which finally culminated in his "Archeological Researches in the Northern Great Basin," published by the Carnegie Institution of Washington in 1942. Here a mass of data which will have ultimate bearing on the problems of the Columbia River was digested and sanely and adequately described. Extensive use was made of extra-anthropological disciplines in the compilation. One interpretation of his results seemed to point toward the south and west, and since truly ancient deposits appear to exist in the region of Klamath Lake, to the west of the Northern Great Basin caves, Cressman has moved his base of operations to that vicinity where he is investigating both ancient and more recent deposits. While Cressman's interests have ranged the State of Oregon, and beyond, his main interest, especially of later years, has been with the earlier cultural manifestations. He has never attacked the problems of the Columbia River as such.

Harlan I. Smith's work often lacks the intense and thoroughly scientific approach of that of Cressman; this is due in a large measure to the fact that much of it was done one-third to one-half of a century ago. His publications are the only reports, in any way extensive, for the northern sections and peripheries of the Plateau as Cressman's are for the southern. From the 1890's to the 1930's he worked or published the results of work along the Northwest coast, in the Thompson-Fraser River area, or down into the Plateau proper. Smith states that there was cultural similarity on the Plateau for 2 or 3 centuries before white contact and that the northern and southern fractions of the Plateau were areas of change. The northern part of the Plateau, especially, was a fount of change and innovation for the southern part and for the coast. Actually, Ray for ethnology and Smith for archeology are largely responsible for the more recent progress in anthropological study in the Plateau. Spier, Cline and his students, and lately University of Washington workers and a few ethnologists from Columbia University make up the last phase of attack on Plateau problems.

H. W. Krieger is the only scientific worker who has paid especial attention to the banks of the Columbia River. Through the 1920's and early 1930's he covered much of the Columbia River itself and did some work up a few of the main tributaries. He did the sole excavating within the Bonneville Reservoir area; and, while this work was woefully underfinanced, there was a certain amount of excavation and a good deal of survey accomplished. Besides the work at Bonneville his other single most important excavation was at Wahluke in Grant County, Wash. Krieger has certainly made more use than any other investigator of the really extensive collections that exist in private hands and in small institutions throughout the area. His notes on these must contain much of real value. It is indeed unfortunate that he has not been able to publish a digest of this material, of his surveys and his excavations. Those interested in the anthropology of the Plateau have awaited patiently and overlong some word from Krieger.

Some time before Cressman's extensive work in southern Oregon, Krieger suggested Plateau-Basketmaker similarities. It would be interesting indeed, with Cressman's work before us, to have a report on Krieger's findings.

Investigators from the University of California, during the seasons from 1924 to 1926, worked in the Middle Columbia. These men, W. Duncan Strong, W. E. Schenck, and Julian H. Steward, have published what is surely the largest and most valuable report on Columbia River archeology. While they did some work on the Willamette Valley and along the Columbia upstream from Portland, most of their efforts were confined to the stretch between the mouth of the Deschutes downstream to The Dalles. Their conclusions regarding Sahaptin and Salish movements, the spread of cultural items such as cremation, are worthy of further testing.

That archeological work in the Grand Coulee Reservoir was done at all is a monument to a number of people and organizations who had only moral and scientific responsibility to carry on the work. It is unfortunate that they did not have the financial backing that would have given their capabilities full play. The results of their work (Collier et al., 1942) seem to agree with those of Smith and point to the north for much local cultural impetus.

Some beginnings were made by Laughlin in Willamette Valley archeology and may soon be brought to fruition by workers from the University of Oregon.

It can be seen from the above summary, which covers the major archeological projects and publications on the Plateau, that the area has held a thin and scanty interest for Americanists. If the River Basin Surveys can complete the program that their Survey Reports have outlined, the situation will be materially changed. Archeology should be able to test some of the basic assumptions as to the movements of peoples centripetal or centrifugal to the Plateau. Ray et al. (1938) have published a digest of information concerning population movements along the southern boundary. The thesis of this paper could be, perhaps, tested archeologically. The influx of Plains traits, the spread of house types, and the varying degrees of exterior trade and influence are a few of the larger problems to which archeological data may apply.

ETHNOGRAPHIC COMPARISONS

Table 22 details the presence or absence of a selected list of traits from the excavated McNary sites as opposed to ethnographic records of a number of Plateau tribal groups. A large proportion of these traits are listed as they are given in Ray's culture element distribution study of the Plateau (1942). To facilitate comparison with this work, his element numbers appear in parentheses after the traits that are found in that book. Stewart's similar study of the Paiute (1941) has been used in the same way although only one item (broken cobble knife—875) is taken from his list. That element was absent in Ray (1942). The culture element lists have been extensively supplemented by the major ethnographies: Cline et al. (1938) for the Southern Okanogan; Teit for Interior and Northern Salish (1900, 1906, 1909, 1930); Turney-High for Kutenai and Flathead (1941 and 1937); Ray for Sanpoil and Nespelem (1933); Spinden (1908) for the Nez Percé; and Spier and Sapir (1930) for the Wishram. As a result, many of the blanks which were not filled by Ray, who was relying on informants, have been filled in this study. When there was no doubt as to tribal affiliation, there has been no hesitancy in using some of the older sources. This is legitimate as archeological traits are being used as a springboard. Withal, there are no doubt many blanks in the table which should be signified as present for the tribe in question. That they are not may reflect a too hurried survey of the sources in some instances. However, generally, there has not been as full a statement on material culture in even the more modern ethnographies as an archeologist might desire. As mentioned in another connection it is highly possible that a table of this sort is more accurate than the disgruntled worker, fresh from pouring through ethnographies written a generation too late, might believe. A trait, if rare in an area, is much less apt to secure ethnographic recognition, i. e., to be remembered by an aged or acculturated informant, than is a trait that was locally outstanding. Therefore, while many of the blanks in my list should no doubt be filled, if one were able to hew to the line, they still must represent cultural disinterest in the trait and as such should not be given full "present" rating. The black and white of a trait list no doubt overemphasizes many of these situations but it may be more correct than one is apt to believe, at first consideration.

The abbreviations used in table 22 are the usual ones: Th—Thompson, Cd'A—Coeur d'Alene, SP-NP—Sanpoil and Nespelem, NP—Nez Percé, Sh—Shuswap, Um—Umatilla, Li—Lillooet, Fl—Flathead, Ok—Okanogan, Kp—Kalispel, Kl—Klickitat, Ki—Kittitas, We—Wenatchi, Ku—Kutenai, Te—Tenino, Ch—Chilkotin, Ws—Wishram, Ca—Carrier, CL—Lower Chinook, and Pai—Paiute. "P"

TABLE 22.—*Ethnographic comparisons*

McNary traits	Th	Cd'A	SP-NP	NP	Sh	Um	Li	Fl	Ok	Kp	Kl	Ki	We	Ku	Te	Ch	Ws	Ca	CL	Pai
Stone boiling (1664)	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Stone projectile points (2371)	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Earth oven (1686)	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Indian hemp (2938)	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		P
Coiled basketry (2806)	P	P	P	P	P	P	P		P	P	P	P	P	P		P	P	P		P
Trade bead necklace (3481) (Bur)	P	P	P		P	P	P	P	P	P	P	P	P	P	P	P			P	
Mortuary furnishing (5727)	P	P	P	P	P	P	P	?	P	P	P	P	P	P	P	P	P	P	P	
Digging-stick, crutch handle (2086)	P	P	P	?	P	P	P	P	P		P	P	P	P	P	P	P			
Twined basketry (2810)	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P		P	P
Twined rush mats (3001)	P	P	P		P	P		P	P	P		P	P		P	P	P	P		P
Dentalium necklace (3473)	P	P	P	P	P	P	P			P	P	P	P	P	P	P	P		P	
Deer most important animal (678)	P	P	P	?		P	P	P	P	P	P	P	P		P			P	P	
Soil burial (5740)	P	P	P	P		P	P	P	P	P	P	P	P	P	P					
Beaver teeth dice (4043)	P	P	P		P		P		P	P	P	P	P			P		P	P	
Stone spear tip (2468)	P	P			P	P	P	P	P	P	P			P	P	P	P	P		
Antler wedge (2099)	P	P	P	P	P	P			P	P	P				P		P		P	
Twined basketry hat (3223)	P	P	P	P	P	P		P	P	P	P						P			PR
Wrist bracelet (3483)		P	P		P		P	P		P	P	P	P	P	P	P				
Corpse wrapped in mats (5677)	P		P			P	P	P	P	P	P	P	P		P				P	P
Trumpet-shaped stone pipe (4284)	P	P		P	P	P		P		P	P	P	P	P						
Tapered stone pestle (1986)		P	P	P	P	P			P	P		P	P				P		P	
Stone knives, wood haft (2164, 2170)	P	P	P	P	P		P	P	P					P				P		P
Shellfish eaten (1622)		P	P	P		P			P		P	P	P		P		P			
Beaver-teeth tools (2176)	P	P				P	P			P	P				P			P	P	
Arrow abrader, sandstone or tufa (2331)		P		P	P	P	P		P	P				P	P					P
2-ply cordage (2947)	P	P	P	P			P	P	P					P	P	P		P		
Tubular pipe (cigar shape)		P	P	P				P	P	P		P	P		P					P
Head of corpse to (W) (5761)	E/W				W	W	E	E				E	E	W	W		W?			
Corpse on back (5759)	P		P		P			P	P	P	P	P	P	P	P					
Burials near village (5745)		P	P	P	P			P		P	P	P	P							
Stone celt (2136)	P	P		P		P	P		P		P					P	P			
Head deformation (2386)	P	R		R		R					P				R		P		P	
Flexed burials	P	P	P	P	P		P		P	P				P						
Pear, bottle mallets (2123, etc.)	P	P	P		P		P	P	P							P				
Stone pointed drill (2156)	P		P				P	P								P			P	P
Stone slab or mortar base (1973)	P	P		P			P	P						P		P		P		
Deer bone awl (2180)	P	P			P	P		P	P					P				P		
Grooved stone net sinker (270)		P		P			P					P	P						P	
Suckers eaten (12)	P	P		P					P					P						P
Cremation (5807)	P	P			P											P		P		
Checker mats (2997)	P	P							P	P				P						

Bison hunted (691)		P		P				P	P					P						
Berry necklace (3480)	P					P		P								P				
Grave lined (5758)	P					P	P	P	P											
Square or rectangular house pit (3745)	P				P		P		?			P	P							
Nipple-tipped mallet	P		P	P			P													
Snubnosed scrapers	P	P		P					P											
Pit and circle design	P		P	P																
Broken cobble (spall) knife (875)				P																P
Eagle bone whistle (4209)		P						P	P											
Carved combs	P																			
Type II-a points	P	P		P																
Fir tree design	P				P															
Slanted base knife or spear	P																			
Skeleton design	P																			

indicates presence; blank indicates no data; "?" indicates presence doubtful; "R" indicates rarity; "E" indicates East, and "W", West.

After the material had been gathered and tabulated it was rearranged so that the tribe with most of the McNary archeological traits was placed in the first column, etc., and the most widely used traits fell in the top lines. There has thus been a decrease in tribal correspondence to McNary toward the right and a decrease in trait use toward the bottom. Most of the empty blanks are therefore toward the lower right of the table. This arrangement has often disrupted geographic continuity; the Thompson is now in the column preceding the Coeur d'Alene instead of being beside the Lillooet, etc. The placement used, however, allows one to tell, almost at a glance, which traits and groups stand out. There were one or two disruptions of the sequence; some late information has caused some of the lines to be out of order, but in general the decrease to the lower right-hand corner is gradual enough.

The better studied tribes—Thompson, Sanpoil, Nespelem, Nez Percé, Shuswap—do lead in traits, but the second tribe, Coeur d'Alene, and the middle group—Kalispel, Klickitat, Wenatchi, Okanogan (as a whole)—have not been well studied. Yet they have a large number of filled blanks. Too, the tribes which one might expect to be veering away from the Plateau norm are at the tail of the list: the Kutenai, Tenino, etc. At present, it is felt that the northern Plateau was a stronghold or seat of classic Plateau culture. As one comes south or goes east from the Thompson River in the Plateau, he leaves behind a certain concentration of typical traits. Very possibly the blame for this may be laid to the heavy draft of Plains traits which began to seep into the area across the Rocky Mountains and around the southern end of the Northern Rockies sometime not long before Lewis and Clark—and soon became an undammed flood. This overlay, as Ray has called it, has no doubt blanketed and smothered many phases of local, especially material, culture in the areas nearest its source, and farthest from the Thompson. It should be recalled that the Shuswap of the north Plateau did not have the horse until about the mid-19th century.

By and large it is the more general traits that are congregated at the top of the list: stone points, coiled basketry, mortuary furnishings. About midway down, where there is a decided spreading out of filled blanks, tapered stone pestles, beaver-teeth tools, and two-ply cordage are seen. Near the bottom are somewhat more specialized traits: spall knife, bison hunting, nipple-tipped mallet. It is with traits of this latter caliber that one might expect to eventually block out culture areas within the Plateau or to distinguish aspects or components. When there is a fair scattering of excavated sites and an ethnography or two more it may be possible to continue for archeology and material culture what Ray (1939) did for the social and religious aspects. As stated, there is, here on the ethnographic level, a foreshadowing of such areas: a fringe on extreme east, south, and west up to about the Wenatchi, and within this a more solid core of typical culture. The Southwestern Chinook and their Sahaptin neighbors, the Tenino, partook more of the downriver Chinookan forms. The eastern tribes, the Flathead and Kutenai, were originally Plains as much as Plateau and remained strongly so, especially the latter which had many Woodland traits. In the west were such groups as the Wenatchi and Methow (not in list) for which there is a definite lack in the literature. The same is true of the two northern tribes, the Chilkotin and Carrier.

It is interesting to note that most of the traits of the McNary archeological sites are strongly Plateauan; this in spite of the fact that only late archeology is present. Plains ways and thinking are known to have been present through much of the life of site 45–BN–3. The presence of the bone flesher-adz is an archeological indication of the penetration of Plains material culture. This situation gives one definite hope for future analysis of the Plateau as a whole.

DISPOSAL OF THE DEAD IN THE PLATEAU

The data recorded in the section "The Burial Complex, 45–BN–3," indicate a single and fairly simple burial complex. This complex will be analyzed here, and comparative data from elsewhere in the Plateau will be gathered and presented in an effort to draw a fairly comprehensive picture. As with other aspects of this report, this, too, must be accepted as preliminary. The material as presented is often of a sporadic, incomplete nature. Conclusions are being drawn from it and a most meager background of scientific excavation. Perhaps work in progress and planning will change or enrich it in the next decade or so. At any rate, it will and is serving as a suggestion box for future work.

A discussion of deformation, dental pathology and osteopathology, etc., will be found in Newman's appendix. An examination of the question of skull deformation in the Plateau was made independently by Newman and by me. Our sources and conclusions were in such close agreement that nothing could be gained by repetition; consequently the material appears in Appendix 1.

All burials with the exception of questionable or disturbed cases, and one child's, yielded burial furnishings. It would seem that the interment of useful or ornamental objects with the dead was an almost invariable rule here. Ray (1942, p. 217) notes it as an almost unanimous procedure in the Plateau. If one recalls the examples of perishable material saved (described below) it seems reasonable to conclude that rich and varied offerings in this category were also present originally.

Neither sex received preferential treatment in any way. Thirty-seven skeletons were assigned to the sexual categories. Sixteen were male and 21 female. Of these, 14 males and 20 females had grave goods. Graves of 5 males, 4 females, and 2 children might be called richly furnished. These figures are probably rather close approximations of the ethnographic situation and may be accepted as indicating lack of sexual and probably status correlation with burial ceremony. Of the children's or infants' graves excavated, 7 had grave goods and 2 were richly furnished. The four richest burials were: 25 (F), 36 (M), 39 (F), and 48 (child).

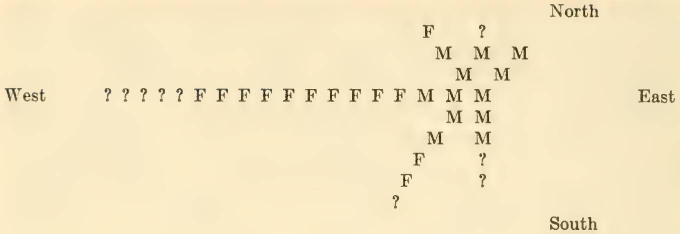
While the wood cists or protecting cones were traceable around only about one-third of the burials, it seems unquestionable that the proportion of adults that were buried with this covering was much larger. About one-third of the burials were so badly disturbed that data of this nature would not have been observed. Of the remainder, one-half were enclosed in cists. Data preserved on the profile (map 4), taken with those recorded above, indicate that plank cists were not ordinarily used in the graves of children or infants. It is not unlikely that this type of grave lining, or related variations, will be found to be rather a widespread trait in at least the eastern and northern Plateau. Harlan I. Smith has illustrated and described an identical structure (1900, pl. 26, p. 432) from south central British Columbia. Jay Perry (1939) has given perhaps most of that which is presently known as to the form and distribution of these burials with the exception of Smith's, and Collier's information and that from 45–BN–3. Perry was led to believe from his experience that the "cedar ring" burials were precontact. At 45–BN–3, of course, graves of this type were found with iron objects or glass beads. It is possible that downriver 45–BN–3 people received white goods earlier than the upriver groups in the area with which Perry was familiar. This suggestion is apt to be discounted, however, by anyone familiar with the extensive aboriginal travel and trade in the Plateau. Indeed the suggestion that these cists saw use through a rather extended period and over an extensive area would be more impressive. Lewis and Clark describe what may be this type of grave from eastern Washington on the Snake (Coues, 1893, vol. 2, pp. 627–628), but did not observe or did not note it from much below.

Speculation as to the method of formation of these truncated wood cists is not very fruitful. Perry believed that the grave was dug, the boards set up, the flexed body inserted and the boards and/or sticks leaned over and against the body. In the field it was sometimes observed that the grave was dug, the body placed therein, and the boards then placed around the latter (the plank ends were often over or within parts of the burial). Either sequence might have been followed. A variant of the plank cist was noted by Collier et al. (1942, pp. 39–40). Here the cedar boards were definitely a post-burial grave cover or marking rather than a cist. The tops were burned off as with the McNary burials. While the decayed condition of many of the 45–BN–3 plank cists may vitiate the following statement, it is probably true that we found at 45–BN–3 nearly all types of these cists including the complete ones of Perry and the degenerate types described by Collier. This might be interpretable as illustrating the breakdown of a burial complex.

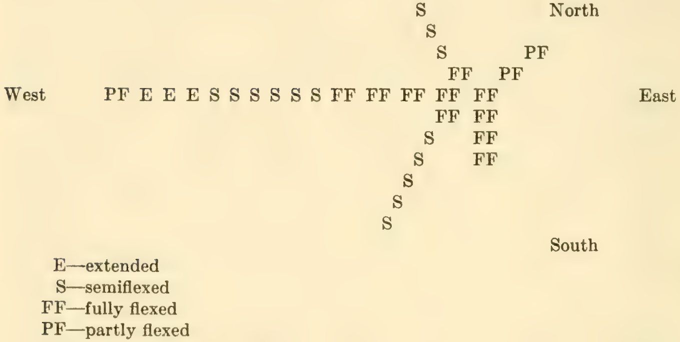
Most of the above data validate the following conclusions: plank cist burial is a widespread Plateau trait which was in use in both historical and precontact times. The sticks and planks may have been left protruding above the ground (grave markers?), as was noted by Lewis and Clark, or (more probably) may have been burned off even with the surface. There is likelihood that this fire was an integral part of the ceremony and that food, at least, was placed in it. Some such sequence as Voegelin notes for the Maidu and Nisenan may have obtained (Voegelin, 1942, p. 142 (4401)) or, in an attenuated form, as Dixon has described for the Northern Maidu (1905, p. 243).

The five orientation diagrams (fig. 6, *a–e*) are illustrative of the burial complex as a whole. They have been constructed in the manner of a compass rose with, of course, the orientation as the foundation of the diagram. This type of diagram requires no clarification and it is not necessary to take the time to analyze each one. Rather, there will be presented a few conclusions drawn from these diagrams and similar data contained in the section descriptive of the burials themselves.

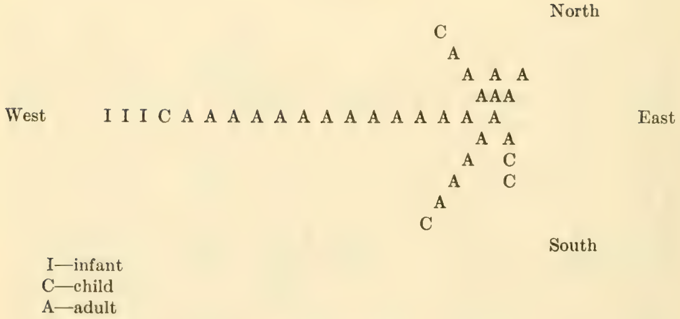
First, it is obvious that a westerly orientation was accepted as culturally preferable and that both sexes were treated alike in this respect. Smith (1900, p. 404) noted a westerly orientation in the northern Plateau. Flexure of some degree was usual. The extended burials were always those of infants or children. It is obvious, when looking at the problem from the point of view of both sex and age, that semiflexure or loose flexure and full or tight flexure split the honors about equally. Thus, position here is really degree of flexure. Of the males five are full flexed and six semiflexed or partly flexed; of the females, five are flexed and seven partly flexed or semiflexed. In the questionable category were one flexed, four semiflexed, and three extended—infants or children. Of the adults, 10 were flexed, 14 semiflexed; 1 child was flexed and 2 semiflexed. All but three of the adult burials were accompanied by grave goods. Of these, 20 had goods of original white manufacture with their aboriginal furnishings. Sixteen had aboriginal material only; one had none, and of the infants one


North
F ?
M M M
M M
West ? ? ? ? ? F F F F F F F F F F M M M East
M M
M M
F ?
F ?
?
South

a, Sex and Orientation of Burials

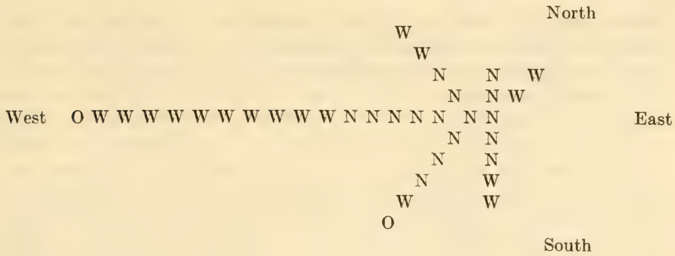

S North
S
S PF
FF PF
West PF E E E S S S S S S FF FF FF FF FF East
FF FF
S FF
S FF
S
S
S
South
E—extended
S—semifiexed
FF—fully flexed
PF—partly flexed

b, Position and Orientation


North
C
A
A A A
AAA
West I I I C A A A A A A A A A A A A A A East
A A
A C
A C
A
C
South
I—infant
C—child
A—adult

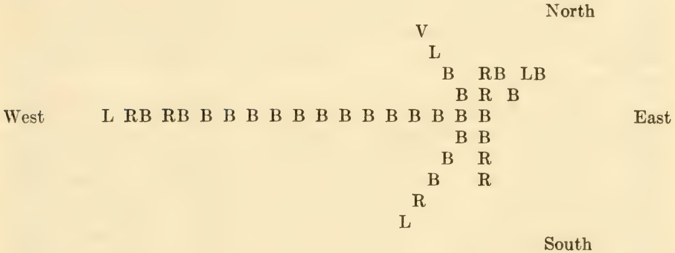
c, Age and Orientation

FIGURE 6.—Burial orientation and associated traits.


North
W
W
N N W
N N W
West O W W W W W W W W W W N N N N N N N East
N N
N N
N W
W W
O
South

O—none
W—white and native
N—native only

d, Grave Goods and Orientation of Burials


North
V
L
B RB LB
B R B
West L RB RB B B B B B B B B B B B B B East
B B
B R
B R
R
L
South

V—ventral
R—right side
RB—right side and back
L—left side
LB—left side and back
B—back

e, Deposition and Orientation

Figure 6—Continued

had native only, two had both white and native. The 50–50 proportion of types of grave goods as illustrated by figure 6, *d*, exaggerates the importance of the "native only" category, while the relationship given above with age is more thorough.

The deposition-orientation, figure 6, *e*, indicates a decided preference for the placing of the dead on the back.

Here it might be noted that the burials that contain goods of white manufacture are usually limited to objects of iron. True, there are a few glass beads and copper tube beads but these were (or certainly would seem to have been) strongly overbalanced in value by the iron knives, usually shaped and hafted according to native methods, which were found in the graves. From this, I deduce that either iron weapons (of the contact materials available) were considered of sufficient value to be placed with the dead or that beads and copper were of secondary importance. There exists the further possibility that the large accumulation of beads, copper, etc., to the east of the burial area was built up largely after most of the burials. It is known that beads were available in the early days of trade. It is therefore felt that there was a strong preference for certain articles of white manufacture or even different standards of value for such things as iron knives and copper tube beads. The possibility that there was later occupation of the site during which time such objects as the gun pieces, remnants of (powder ?) cans and bits of chain were deposited will not invalidate the first conclusion. There was no variance in the types of artifacts found with the burials and those in the midden. No reasonable doubt can exist that a single occupation and a single burial complex is represented here. The depths of the burials are similar; many burials originate in the first layer and all might well have done so.

It should be pointed out that experience showed us that it is not possible to judge the orientation of a burial by the appearance of the top of the cist (B37). Too, the presence or absence of trade goods was not indicative of the relative ages of the burials (B44 and B48). Furthermore, burials (like B49) that appeared to be inclusive in the lower midden layer were linked with the certainly superficial upper layer burials by the inclusion of trade goods in the graves of the former. Further attempts to break down the 45–BN–3 burial complex have not been successful.

Finally it should be mentioned that the carved effigies or amulets and "lucky" (?) stones were never "killed." Of the 5 burials that possessed these artifacts, 2 were female, 2 male, and 1 remained unidentified as to sex. "Killing" of artifacts in burials is, of course, widespread. Although Ray (1942, p. 217) does not list it for many of the Plateau tribes, the sacrifice of grave goods, including their destruction, is recorded by Strong et al. (1930) for the Lower Middle Columbia, by Krieger, and was found at 45–BN–3. Traders and other early writers appear to have recognized it as a Plateauwide trait.

As with 45–BN–3, a southwest and west orientation was heavily preferred by the inhabitants of the Upper Columbia. Site 46 was an almost unanimous southwest site, but the people of site 7 buried their dead with the heads to the east (Collier et al., 1942, pp. 43–56). Collier and his coauthors state that the head was placed downstream. On map 12 appear a series of orientation diagrams similar to figure 6. While the downriver south and west orientation is not invariable here, it is obvious that the complex is the same, as far as orientation goes, as was the 45–BN–3. Whether the flow of the Columbia or the directions were the controlling factor has not yet been ascertained.

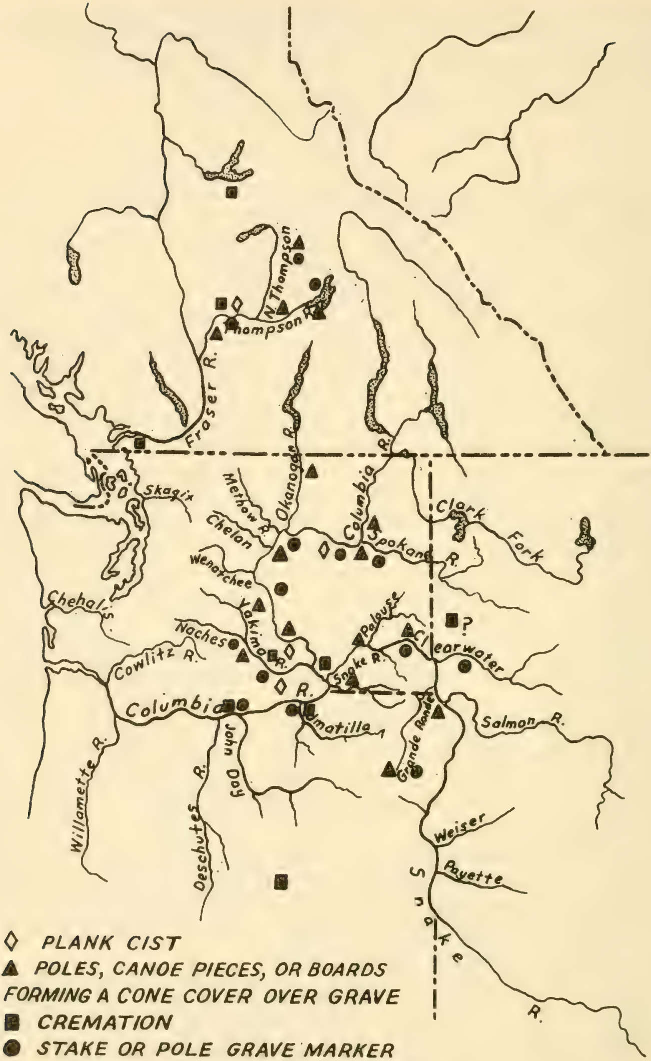
PLATEAUWIDE COMPARISONS

(Map 11)

Enough comparative material has been included with the foregoing burial summary to indicate the position of the 45–BN–3 complex within the Plateau. Herewith, there can be some further attempt made to define that complex in time and space.

First, its limit in the Columbia area must be traced. As far as I have observed, 45–BN–3 is the most westerly record of the wood cist burial in the valley, although collectors have mentioned possible cists as far downstream as near the mouth of Willow Creek. Excavation will take place downstream and we will, in a few years, know more. Certainly the wood mausoleums or vault burials that Lewis and Clark described (Coues, 1893, vol. 2, pp. 651, 682–683, 934) from Blalock Island (about halfway between 45–BN–3 and The Dalles), from the Cascades, the mouth of the Willamette, and in Nez Percé territory was an entirely different complex. Perhaps a relative of the plank cist, but a distant one indeed, is the plank coffin of the Willamette (Anon., 1881–1882) and the Wiyot burial method (Loud, 1918, pp. 351–354). In the first of these a fire was built over the grave; among the Wiyot it was nearby (see also Berreman, 1944, p. 13 ff., Schumacher, 1877, p. 34 and passim). No cist burials of the 45–BN–3–Kamloops type are mentioned by early travelers nor were the burial grounds which were a usual part of the Sahaptin landscape: rocky piles or graves in the earth with a cone of sticks or several irregularly placed sticks or poles rising over the grave, seen in the Blalock-Dalles and West area. Strong and his coauthors (Strong et al., 1930, p. 42) appear to believe that the vault burials of the Wishram or other Upper Chinooks had been recently prehistoric and were limited to the northern side of the river and to the islands. Ross Cox found them with recent burials in 1812 (Cox, 1832, pl. 1, p. 124). Poles bearing offerings were set up around. These poles were usually the ones on which the body was carried, slung, to the grave. Their erection is commonplace in the Plateau and adjacent regions.

One doubts that it was Chinookan population as much as Chinookan influence that led to the construction and use of the big vaults on Blalock (Strong et al., 1930, p. 42). This influence was receding, probably one or even two generations before the Lewis and Clark party arrived, partly because, as Strong and his associates suggest, of the arrival of the horse but, more likely, because of the partly


N. Thompson
Thompson R.
Fraser R.
Okanogan R.
Columbia R.
Skagit
Methow R.
Chelon
Clark Fork
Spokane R.
Wenatchee
Chehalis
Yakima R.
Naches
Palouse
Clearwater
Cowlitz R.
Snake R.
Columbia R.
Umatilla
Grande Ronde
Salmon R.
John Day
Willamette R.
Deschutes R.
Weiser
Payette
Snake R.
?
◊ PLANK CIST
▲ POLES, CANOE PIECES, OR BOARDS FORMING A CONE COVER OVER GRAVE
■ CREMATION
● STAKE OR POLE GRAVE MARKER

MAP 11.—Distribution of burial traits.

concomitant but largely later sweeping in of Plains traits. It is amazing that there does seem to have been an echo or remnant of the mausoleum of downriver type among the Nez Percé. Two descriptions are found in Lewis and Clark (Thwaites, 1904–7, vol. 7, p. 99; vol. 4, p. 369). The first reference is to a rather elaborate staked grave. The grave itself, covered with stones, was either picketed with stakes or numerous stakes or poles were placed in the rockpile covering. Over this, leaning on and against the stakes, were boards, split, of course, with the mallet and antler wedge. This appears to be almost a hybridization of two methods: vault and staked grave. In the latter reference a perfectly good mausoleum is described; bodies were apparently covered with boards and then stacked in tiers in the sheds as they were near Wishram. There was not, apparently, much deviation from the Chinookan methods. Boards were arranged "like roofs of houses"; many horse bones lay about. The same group (Chopunnish or Nez Percé) also practiced earth burial and used canoes (broken to pieces?) "to form kind of sepulchre like the roof of a house" during the time of Lewis and Clark. Gass, of the Lewis and Clark expedition, mentions a canoe split in pieces and put around a grave, as if this were a regular procedure for the Middle Columbia-Lower Snake area (Gass, 1904, p. 161). Presumably this was aboveground and was not an underground cist. It seems that there might be here the germs or vestiges of the vault or board-covered grave concept which flourished below and was seen among the Nez Percé. That the fact of Nez Percé vaults is significant is obvious. The interpretation, on the other hand, is somewhat more elusive—and does not become less so with the examination of the possibilities. These are two: either the Nez Percé were retentive of an old method of burial or they were making use of a method that had diffused to them, presumably from downriver, and probably not so many decades before. If the former, then these most progressive of Sahaptins carried the trait from wherever their homeland was and eventually sent it downriver to the Chinookans (or had left it there) among whom it flowered near The Dalles. The latter explanation (that shed burial was a diffused trait) is much simpler and consequently more credible. All of the early explorers mention Nez Percé, or Chopunnish, or Sahaptin bands at or near The Dalles. Regularly, trading, fishing, gambling, and horseracing groups repaired to Wishram. Furthermore, individuals of, we gather, all shades of moral and financial complexion, from Northwestern America visited this aboriginal metropolis. Travel moved both ways; Townsend (1905, p. 225) appears to have met a party of Chinooks, or their near neighbors, in southeastern Idaho. Wilkes (1845, vol. 4, pp. 380–386) indicates that in his time (early 1840's) most of the Indians that one saw at The

Dalles were actually transients. The discovery of traits which were at home in The Dalles, in any part of the Plateau, should occasion no surprise. On the other hand, and this thought will appear again later, there are some reasons for considering Nez Percé culture as retentive of some of the older Sahaptin facets. The apparently richer bone complex, reminiscent of the Fraser section, is not exactly in context for a group of Sahaptins who were forsaking river life. It must represent a time when material culture differed and may even be a hint as to the ultimate direction of Sahaptin movement. The lower Fraser, and probably the upstream areas as well, were much less sparing in their use of bone and antler than the rest of the Plateau. One looks forward to the time when archeological work in the Nez Percé country will enable us to compare complexes from there with the north and with the lower Columbia. In line with the suggestion that some aspects of culture were working up-Columbia at least as far as Nez Percé country is Smith's observation (1903, p. 170) that *Dentalium* and shell on the Fraser were as rare as the bone artifacts and ornaments so common in the north were along the Columbia. For this reason, Strong et al. (1930, p. 72) suggested that the use of *Dentalium*, at least, was a trait (and, we should add, a trade) that ascended the Columbia recently. The importance of the tusk shell among the Nez Percé is well known. Of course, it was traded and used far out in the northern Plains of this country and adjacent Canada. There is no reason why burial complexes could not have traveled with dentalia.

Before leaving the question it should be mentioned that the Blalock Island burial vault complex had not died when the United States Exploring Expedition party passed that way in 1841 (Wilkes, 1845, vol. 4, p. 389). Apparently the vaults themselves had decayed, but shrouded bodies with mortuary offerings were simply covered with boards "placed as a kind of shed." It rather sounds as if, in the generation since Lewis and Clark, The Dalles-Blalock system had been broken down to about the type of thing that Lewis and Clark saw among the Nez Percé in 1805. Rapid disintegration might be expected along the Columbia, that highway of traders and of white strength. Along this same line, Curtis (1907–1930, vol. 1, p. 7) records true canoe burial among the Yakima. The body was placed in one canoe and pieces of another canoe covered it. This was limited to the river group of the tribe. It is rather certainly another instance of penetration of a prime downriver trait.

Lest it be gathered that Nez Percé culture was separating itself from the Plateau in very early times, the Bonneville records (Irving, 1850, pp. 52–103) might be mentioned. They illustrate beautifully the dilemma of this typically Plateauan nonwarlike group during the early years of its contact with the Blackfeet. The mighty feats of this tribe under Chief Joseph cause us to lose sight of the earlier true character of his people's culture in this respect.

That the old Chinookan ways (if they are truly so), such of them that we find deep inland, did not die easily is shown by the still large percentage of flattened heads to be found along the Columbia near Umatilla as late as the late 1700's and early 1800's (45–BN–3 graves). So far, no references to this deformation have been gathered from early travel reports, except such statements as appear in Bancroft (1874, vol. 1, p. 227), which indicate that, without a doubt, there was attenuated deformation of the skull practiced east of the Cascades and apparently among most Sahaptins and many Interior Salish. Townsend (1905, p. 304) says that only a few women with flat heads appeared as one went east. This seems to be a complex that is on the wane rather than a growing tendency. The wide spread and the confinement to the often conservative female element reinforces this feeling. It is difficult to be certain but one gets the impression from reading the Lewis and Clark narratives that these earliest explorers were more impressed with the amount and quality of deformation in the interior than were later men in the same area (Thwaites, 1904–5, vol. 3, pp. 125–126, 137). Perhaps this is merely a circumstance of observation or record. Certainly the trait in the interior is weak in the upriver region when compared with its importance among the downriver Chinook. It is therefore easily understandable that men who had just come from Fort Vancouver—or Astoria—where wedge-shaped pates were commonplace, should not deign to record in detail the far less noble frontals of the upriver people. On the other hand, men who came from the east might record the Sahaptin deformation with emphasis as it would be the first seen. A final word will come from excavations and the McNary ones should supply this, although later checking is desirable. Newman has (Appendix 1) shown beyond a reasonable doubt that BN–3 deformation would, in only a few individuals, be of a noticeable degree.

Cremation, like cist burials, is another of the unsettled problems of the archeology of the region. The Dalles-Deschutes workers could not be certain as to the definite place of cremation in the burial sequence of their region but felt that it was generally earlier than most of the soil and rockslide burials, many of which had trade goods in them. At 45–BN–3 there was the slightest hint of cremation. One of the later skeletons found by a collector was somewhat singed, perhaps accidentally. But, on Sheep Island, several miles upstream, definite cremation pits have been found and below these, in definite stratigraphy, lay flexed burials, their not excessively deformed heads usually to the west. There were no trade goods with them and there were no cists around them. No trade material was found in the cremation pits. Smith (1910, pp. 7 and 142) and Krieger (1927, pp. 193 and 197) have recorded somewhat similar pits from the Yakima Valley and Wahluke. There is no evidence that any of these were postcontact. Cremation is denied ethnographically in the Upper Columbia area, and was not found in either Grand Coulee or Chief Joseph reservoirs. Its extent in the north, again ethnographically, and in the Thompson-Fraser area, and on the coast has been recorded by Smith (1907) and Smith and Fowke (1901). To the south, of course, cremation among the Northern Paiute is well known (Stewart, 1941, p. 412 (2412)). Reports of collector's finds of cremated remains from as far east as western Idaho have reached my ears.

Smith (1910, p. 142) refers to "cremation circles" of stone and suggests that these may be the remains of mausoleums or burial houses (which, I should add, were presumably burned ceremonially rather than fired accidentally). Smith speaks of "earth covered burial lodges" for which we should probably read "shed mausoleums of the Nez Percé, Blalock, or Wishram type." Krieger (1928 b, p. 10) differentiates between cremated burials and secondary burials of bones which he suggests were brought from Mamaloose burial islands (and, if I read him correctly, were also burned). Certainly there seem to have been (if they have not all been destroyed by nonscientific investigation) pits of respectable size, outlined with stones and well-filled with cremation remains from the Umatilla area (45–BN–55—to be published) on up the Columbia, and up the Yakima for some distance, and up the Snake for an undetermined distance. There is good reason to suspect that they are the remains of purposely burned burial sheds. If more of these remains can be found, we may some day be able to trace those aspects of culture, which they represent, to the extent of their ranges. Ray (1939, p. 61) states that the Coeur d'Alene "very rarely" cremated.

The plank cist, too, covers vast territories. It was first reported from the Thompson River region (Smith, 1900), was found as a common practice among the people of the Upper Columbia, appeared to be wholly precontact in central Washington (Perry, 1939, pp. 80–83) and was, as we know, well developed in early postcontact times in what is now Umatilla country—but was not remembered by Ray's Umatilla informants. In a nutshell, a small one, that is the picture of the earlier burial types in the Plateau. Rock slide burials always appear to be late—possibly because late burials in rock talus slopes are the only ones that can possibly be located or in which the crushed bones can remain sufficiently undecayed for recognition. The graves with stake markers, either the single carrying pole or in the form of a tentlike cone of poles or stakes (Ross, 1849, p. 133) or as a small forest of sticks, is without doubt late as far as we can tell from the reports and archeology. The information available does not mean that the stick-pole methods of marking graves did not see extensive use in earlier times but makes it appear rather less likely. In this context it should be pointed out, that, were the stakes of one of those small tents or tipis of poles set deeply around the body (which they sometimes were) (Smith, 1900, p. 432) and then burned off, we would have a condition much like that seen in 45–BN–3 and the Upper Columbia graves. Shuswap pole-tipi graves were large—up to 20 feet in diameter (Masson, 1889, vol. 6, p. 167).

The artifact complex, the whole site in fact, which contained the stratified cremations and burials in McNary (Sheep Island, 45–BN–55) has not been studied. Work is only now getting underway on it in the laboratory and it cannot, therefore, be used in an interpretative framework. Still, perhaps something can be drawn from the information presented above.

Working back in time we find that the cist, with which we are particularly concerned, was precontact in the north; in the Upper Columbia cist graves had burials with and without trade goods in them. Farther south, in Perry's region, the cists had no trade goods, but in the 45–BN–3 area they were rich in these offerings. Yet, in spite of use in postcontact times in north and south Washington, there are no ethnographic records of the practice that I know of except three, which may have, at one time, been part of the complex. Teit (1906, p. 269) mentions stone rings around Lillooet graves and (Teit, 1930, p. 288) states that for deeper graves a circle of rocks around the grave was used. Stone rings were closely associated with the Upper Columbia wood cist graves (Collier et al., 1942, table 2). Hill-Tout (1895–1896, p. 116) tells of ceremonial fires over graves as does Dawson (1892) for the Shuswap—apparently an integral part of the 45–BN–3 burial complex. The lack of trade goods with cists in central Washington does not fit our picture. This may be because of the few graves opened and the poor methods employed although it is entirely possible that the practice was abandoned there before white trade flowed into the region. Otherwise, wood cist burial is late but never ethnographic except in the extreme north where a few attenuated remnants have lingered on in a hinterland relatively well protected. The interpretation made here is that this method came from the north through the Okanogan (Collier et al., 1942, p. 40, found no cists or stone rings north of the Spokane River) area and down the Columbia where it met Chinook influences from the west. At this period, also, there were beginning to be felt, even on the remote Columbia, those stirrings which the horse, buffalo, guns, and white pressure were making on the Plains. Tribes which we think of as living in or west of the Rocky Mountains were then east of them, on or bordering the Plains: Flathead, Shoshoni, Kutenai, even Bannock and Crow. It is very possible that one of the "Plains overlay" changes in the Columbia was the complete substitution of simple earth burial or rockslide burial, often with stakes, for the old cedar-plank cist. The Okanogan area, incidentally, should be an excellent area for further scientific work. It was the meeting place and funnel for traits passing from north to south Plateau and vice versa. House types were mingled here and Teit (1930, p. 288) speaks of canoes on graves (possibly a southern trait) and carved wood effigies like the Thompson used over graves.

We do not know of any sequence in the Upper Columbia area except that rockslide burials are, absolutely speaking, late. In the north (Fraser-Coast) the cairn-cist-cremation complex is precontact. Rock slide and soil burials came later. Surely the elaborate cairns of the coast are very early. Cists of as great age have not been found inland and they probably do not exist.

To return south, to the McNary reservoir; here, as has been stated, cremations preceded the cist and were in turn preceded by soil burials without cists. It is recognized that the latter two of the series (cremation and cist) could have been contemporary as they are not stratigraphically related. No trade goods, however, were found in the cremation pits so a sequence is probably valid. With this sequence and the aforementioned apparent trending of influence of burial forms from the north another step can be taken—especially if we recall that cremation pits run like a companion thread to the cist through central Washington. It would seem that we can logically point to the north as the locus of origin as far as cremation goes. Certainly it is a stronghold for that trait ethnographically. Ray (1939, p. 63) interprets it, even in the north Plateau, as a result of (northern) coastal influence. The interpretation here, which does not go back as far as Ray does, is that it is another of the influences or traits which came to the south from the north and welded northern and southern Plateau together. Whether the burnings of the Yakima, McNary, and Dalles-Deschutes were contemporary or not cannot be decided with our evidence. There is good reason to believe that all or nearly all were pre-White. The Dalles-Deschutes pits were the only ones not above suspicion in this respect. The evidence given above, while thin, is evidence for a downstream trend. Whether the penetration of cremation into the Chinookan burying and mausoleums-using area was an actual cultural penetration or depended upon migrant or local Sahaptins (Tenino) cannot be stated. The excellent artwork suggests the latter, if Sahaptin at all.

As far as can be seen, therefore, there was within the present range of our archeologic knowledge a vast amount of change in burial custom. Kroeber's stand (1928) is vindicated within this area. We may sum it up thus: the first group that we know so far in McNary, buried. They showed downriver or far northern-coastal influence in their flattened heads. Later, cremation, coming downriver from the north was adopted. This method of disposal spread far to the west and may have lasted until very early trade days—perhaps until the 1780's. As it spread it was followed by a third fashion, that of enclosing the dead in cists, also from the north. This reached the Umatilla area about the same time that a trend from the west, that of placing bodies in large, wooden, semisubterranean vaults, was spreading upstream, accelerated no doubt by the prestige of the wealthy Chinookan traders of the lower river. This form, however, required rather more tribal organization or more of a stratified society than was present very far upstream. Somewhere in this central area it met the plank cist. The latter, dying out in the early 1800's (as was the Chinook vault), was replaced by a less complex but related form of burial in which a tent or cone of sticks was placed over the dead. This tent was often no more than a tiny forest of small poles or sticks planted on and around the graves. Too, it sometimes appears as a picket fence around the inhumation. Often, however, a single pole marker, itself a very widespread and probably old trait, was all that could be seen of surface manifestations, even among the Nez Percé. These later changes were surely amalgamated with or were a part of the influences so easily traced as eastern. They were elaborated by many of the (especially) Sahaptins so that the slaughter of horses and the destruction of riding regalia became a regular fraction of the burial ceremony for a male in good standing (Cox, 1832, vol. 1, p. 199). The same author states that the same methods of burial prevailed from the Cascades throughout the Middle and Upper Columbia. These methods were soil burial, sometimes covering the grave with stones and poles or stakes around or above with offerings on them. Cox might, perhaps, not have noticed details of inhumation such as the use of cists, but I doubt if cremation would have escaped observation. Much was, understandably, made of Carrier cremation by most of the early writers.

Strangely, cists of logs, or of stones, or of logs and stones, were used in varying combinations by the tribes that bordered the Plateau on east and west. The Willamette Valley cists have been mentioned. Turney-High (1937, p. 142) describes the entombment for the Flathead. The Kutenai and Nez Percé also seem to have followed the same usage on occasion. There has been no archeological work in these regions so one cannot hazard a guess as to the cultural position of built-up stone or log linings for graves. The similarity of some of these eastern forms to those from the southern area of the Northwest Coast influence, Oregon and northern California, is intriguing. How they would appear archeologically is information that we can only await. This wide distribution suggests age with more recent later penetrations, already mentioned, from north and west.

As a matter of fact, I am sure that cairns, stone circles, and stone-covered graves, plank cists, small conical tents of poles, sticks erected in or over graves, and perhaps vaults for the dead are parts of one or two complexes only. It may be that cremation and partial cremation and the very possible fires over graves are also related concepts. The burning of property in northern California, as mentioned, may be not too different from that which took place near or over some of the 45–BN–3 interments. Exact statements cannot be made on this plane, but I have embodied my thinking and information on the subject in this section.

One can state almost unequivocally that mortuary furnishings were the rule in the Plateau. Quantity and quality varied, but often apparently sterile graves yield, if carefully examined, evidence of perishables. Killing of artifacts was usual. This unhappy practice was not rigidly followed—or at least complete destruction was not enforced—often smaller artifacts were not harmed. The early chroniclers of the region noted the extensive sacrifice of property near or over the graves. This is, of course, lost to archeology.

It is not easy to be sure that flakes, or pieces of unworked material, so often found in fill, are offerings when one finds them near skeletons. This possible inclusion of unfinished tools or pieces of chert or chalcedony appears not be be unusual. We found it in McNary, and Dawson (1892, p. 11) records it among the Shuswap.

It would seem that cremation were fighting a losing battle in the wood-starved Columbia Valley. Krieger (1928 b, p. 12) thought that there might have been plentiful supplies of driftwood because of the amount used in cremation. This may have been so near Wahluke but I am dubious and feel that the opposite were more generally true. It might even be suggested that the burials which Krieger found were inhumed because fuel was lacking.

The tabulation of the traits which form the Plateau disposal methods appears as table 23. Unfortunately data in this context are of the thinnest that there has been to draw upon and there is little to offer in the way of positive correlations. The primary use to which table 23 can be put is as a base for future work. When digging is farther along, such a tabulation can be most useful. At present it shows distributions only. The groups in the Upper Columbia are rather close to McNary as far as inhumations are concerned.

The Vancouver-Straits of Georgia-Lower Fraser area has a similar gross complex, as far as inhumation is concerned, but there is an extreme variance between trait percentages.

The poor information from Lytton and the Thompson River, on the inhumation side, is tantalizing. Careful digging in that area may be expected to lessen the difference as it is expressed in the tabulation.

When cremations and rockslide burials are considered, we see that insofar as the former are concerned there is a scattering of presences which draws the Yakima-Wahluke (as might be expected), The Dalles-Deschutes, and the northern parts more closely into the picture. The same is true for both forms of burial, soil and rockslide, to a lesser extent and is dependent to some degree upon negative evidence, absences, for the Thompson River-Lytton area. Other than this there is a definite break for a large number of the minor traits, between the extreme northern and southwestern Plateau areas and the central Wahluke-Yakima-McNary region. It will be of interest to see if this holds up. I do not expect it to do so. The evidence offered by single traits such as the plank cist is opposed to too great a separation of northern and central Plateau, as can be seen at a glance on map 11. Perhaps the mass complexes will differ in minor details but will be tied together by such things as the plank cist, cedar grave-marking poles, etc.

Map 11 illustrates well the separatism of the cremation complex as it is now known. As a matter of fact the Okanogan River valley and adjacent valleys and areas to both east and west are yawning gaps in our knowledge of the Plateau—archeologically more than ethnographically. There can be no doubt, after an inspection of the table and map, that continuity is strong throughout the whole intermontane area.

THE ARTIFACTS

It must be borne in mind that most of the material that is passing in review in this report is recent from an archeological point of view. Krieger's Wahluke site probably lacks trade material, as does 45–BN–53, but both sites fall into an artifact and culture pattern similar to, if not almost identical with, the later sites like 45–BN–3 and the contact cemeteries that were excavated in the Grand Coulee Reservoir.

Few artifact changes have been noted that took place during contact or later times besides those dependent on trade or cultural dissolution. The use of the serrated end-bitted, legbone flesher or fleshing-adz is one of these few. This tool came from the east, the Plains area. (See King (1947, p. 36, map 5) for its emphatic eastern distribution.) The one from 45–BN–3 (pl. 8, *b*, 15) is the only archeological one of which I am aware from the Plateau. Strangely, no catlinite or elbow

TABLE 23.—*Burial traits*

Group	Semi-flexed	Flexed	Extended	?	Orientation: East	Southeast	Southwest	South	West	North	Northwest	Northeast	?	Left side	Right side	Back	Face	?
Upper Columbia A[1]	31	53	3	7	4.5		73	20					2.5	38	30	15	2	15
Upper Columbia D[1]	27	18	36	19		9.5	36	27				9.5	18		27	36	9.5	27
Upper Columbia E[1]	24	59	2.5	13	15		12	4	44		9	2	14	23	18	36	2.4	18
Upper Columbia C[1]	20	80			60	40								60		40		
Dalles-Deschutes[2]		PP							P?									
Lower Fraser[3]		PP												"On side"				
Vancouver—Straits of Georgia—Juan de Fuca.[4]		74	R	25	3	12	6	17	15	15	20	6	6	16	34	3	6	41
Thompson River[5]	P	PP			P+			P	P					P		P		
Lytton[6]		P+			P			P		P+				Sitting and on sides				
Gold Hill[7]		P						P										
McNary	37	25	4	33			6	4	31	2	14	2	28	6	10	50	2	32
Yakima[8]		P	P		P				P++			P	P	P				
Wahluke[9]		P	Cremations															
Nez Percé[10]									P									

Group	Adults	Child	Infant	Adolescent	?	With artifacts	Plank cist	Burned off	Fire "fed"	Grave lined, rush, hide, boards	Stone circle above grave	Stone circle and plank cist	Cairn over or around grave	Cedar or other stake	Tent of stakes	Shrouded	In house pit
Upper Columbia A[1]	69	15			15	61					2						
Upper Columbia D[1]	63	27	9.5			72						27		9.5	9.5	28	
Upper Columbia E[1]	59	26.5	10	2.5	2.5	59	16	P+			8	24		3.6			
Upper Columbia C[1]	40	20			40	20											
Dalles-Deschutes[2]						60				P			P				
Lower Fraser[3]						P							P?				
Vancouver—Straits of Georgia—Juan de Fuca.[4]						R							PP			P?	
Thompson River[5]						P+	P	P		P	P?			P	P	P+	P
Lytton[6]						P+				P					?	P+	
Gold Hill[7]																	
McNary	80	6	10		4	90	34	PP	P+	P					?	PP	
Yakima[8]	P	P				P	P				P		P	P	P	P	P
Wahluke[9]	P	P														P	P
Nez Percé[10]						P							P	P	P	P	

Group	In rock-slides	Shroud-ed	Grave marker or stake tent	Crema-tions	In pits	With artifacts	Pit, grave board lined	Rock lines or circled	De-formed skulls	Canoe pieces used	Burials close to villages	Horses and dogs sacrificed
Upper Columbia A[1]												
Upper Columbia D [1]	9											
Upper Columbia E [1]	17											
Upper Columbia C [1]	33	P	P			P						
Dalles-Deschutes [2]	P	P?	P	P	P	P	P	P	R			
Lower Fraser [3]												
Vancouver—Straits of Georgia—Juan de Fuca [4]		P?		P				P	P			
Thompson River [5]	P+		P+	P						P	P	P
Lytton [6]												
Gold Hill [7]												
McNary	P			P+	P	P			P+		100 PP	
Yakima [8]	P	P	P	P+					P	P		P
Wahluke [9]				PP					P		P	
Nez Percé [10]	P	P	P						P		P+	P

Key to table: Figures are percentages; graves not listed for special features are inhumations; P=present; PP=the pattern; P+=important; R=rare.

[1] Collier et al., 1942.
[2] Strong et al., 1930.
[3] Smith, 1900.
[4] Smith, 1907; Smith and Fowke, 1901.
[5] Smith, 1900.
[6] Smith, 1899 a.
[7] Cressman, 1933.
[8] Smith, 1910; Krieger and River Basin Survey Reports; Perry, 1939.
[9] Krieger, 1928 b.
[10] Spinden, 1908.

pipes, another late immigrant, were found at 45–BN–3. Perhaps this site was late enough to receive purely aboriginal traits from the east but not to receive those which owed some of their impetus to contacts. It is possible that other evidences of the massive overlay from the Plains will be isolated archeologically.

Table 24 presents a selected list of traits which appear in Plateau archeology. The same sources and symbols that are used in table 23, the burial traits, are used in this. Not all of the usages that appear in table 24 were found in the McNary sites which form the pivot for this study. Of the 55 traits that were chosen as being significant 47 are listed from the McNary sites, 45–BN–3 and 45–BN–53. It was not possible to treat most of the traits as other than present (P), absent (A), or not mentioned in the report consulted (------). It has not been possible, therefore, to use a quantitative approach. As with any study of this type it is necessary to consider that there is a sample here worthy of manipulation. Actually a position based on such a premise would be difficult to defend. Too, one cannot but feel sure, in examining such a list as is presented in table 24, that there are blanks where there should be presences. For instance, there can be small doubt that the conical hole was present in every perforated digging-stick handle in the Plateau. It is the only simple feasible method of attachment. It is not, however, mentioned for most areas and it must, perforce, be left at that. The same is true of antler wedges. All of these simple tools are not, one fears, reported as fully as should have been done. It is always possible, however, that these blanks represent not only a lack of work or publication in an area but reflect a real lack, or more likely, a falling off in quantity or quality for that trait and section. If so, the results here will be so much nearer the true state of affairs. The trade goods complexes are still less in an advanced state of study or publication. A detailed examination of the materials of white manufacture that were found in the Plateau give wholly one-sided or incomplete results. Few descriptive words have been written on copper, beads, etc.; they do not arouse the interest that points and pestles do. It is interesting, however, that no iron bracelets were found in the Upper Columbia while a copper one was found (Collier et al., 1942, p. 103). Iron bracelets only were found at 45–BN–3. The remainder of the iron complexes of McNary and the Upper Columbia were similar, especially is this so of the knives (Collier et al., 1942, pp. 105–106).

There is another point. Working with old reports as has been necessary (the bulk of Plateau archeology was published at or shortly after the turn of the century) has not simplified matters. Terminological difficulties, a lack of maps, tables, charts, and other expressions of quantity and distribution have perhaps caused errors in the charting of traits. The older works, with a lesser interest in simpler artifacts and, perhaps, not as much of an eye for absences, as we would have now, will indeed lower the quality of the sample in the table. The selective nature of the earlier work is well illustrated by the fact that no one before 1930 (Strong et al., 1930) saw fit to publish any of the results of their digging in the most unsatisfactory Plateau house remains—although there was such digging and information available for study. We have not had, as far as I know, a real sample from any site unless such could be claimed from The Dalles-Deschutes area or from some of the cemeteries of the Upper Columbia. There exists, therefore, a certain diffidence about rearing an extensive theoretic or interpretative structure on such evidence as has been gleaned.

On the other hand an investigator can never be wholly sure that his own sites have told him the whole truth. There are a few unexpected lacks at 45–BN–3. No bone needles were found. Possibly wood ones, a good Plateau trait, were preferred. The lack of carved stone generally has seemed peculiar. Absences, truly, do not mean much until one can be certain that he has a positive absence, so to speak. If these absences, and others which may be noted by checking the table, are certain, they will show in other nearby sites. Another weakness exists in the fact that the best McNary site so far studied is a burial site and that only. The village sites are miserably poor yielders. So, perhaps, the McNary sample leaves something to be desired—from the writer's point of view at least. This is not to be interpreted as a dirge or perimeter of defense.

Three summers' diggings, a short three summers, have been done in Plateau reservoirs. This, with the older reports, does make available a certain corpus of material, enough so that a study of interpretation may be timely. Even when operated under such limitations as attend the present archeological work in the Plateau there should be a periodic assessment of results and a planning of campaigns. To a very great extent that is where such a work as this will find its most important place.

For the reasons given above, I have done what appeared possible with the data gleaned from the literature and digging, which appear throughout part 2. The results of the work, theories or speculations or interpretations, leave something to be desired. It certainly would be absurd to defend them to the last. On the other hand, they are not a placebo designed to fill the need for some historical results from three part-summers in the field—until something better comes along. They are the sum of our and others' interpretations to the date of writing and will be used in planning further work in the area. They will be modified only as further data accumulate and warrant.

TABLE 24.—*Artifact distribution*

Group	Pipes					Files (s, scoria; ss, sandstone)	Celts					Arrow smoothers (ba, basalt; ss, sandstone; t, tufa)		Carved combs, antler, bone
	Tubular shape (pl. 19, *b*, 9)	Trumpet shape (pl. 19, *b*, 10)	Wine-glass shape	Trumpet with straight stem	Decorated		Nephrite, etc.	Pointed poll	Unfinished poll	Single bevel bit	Double bevel bit	Medial groove	Diagonal groove	
Upper Columbia A	R	P+	----	----	P	----	P+	R	P+	----	----	P+ss	----	
Upper Columbia D	R	----	----	----	----	----	----	----	----	----	----	P+ss	----	
Upper Columbia E	----	----	----	----	----	----	R	----	----	----	----	P	----	
Upper Columbia C	----	----	----	----	----	----	R	----	----	----	----	----	----	
Dalles-Deschutes	----	PP	----	----	PP	Ps	----	----	----	----	----	Pba	----	
McNary	P	P	----	----	P	Ps	P	P	P	P	P	Pss	Pt	R
Wahluke	?	?	?	?	P	----	P	P	----	----	----	Pss	----	P
Vancouver-Straits of Georgia-Juan de Fuca.	----	P	P	P	----	P++ss	P	R	----	P	P	----	----	
Thompson	----	P	P	----	P	----	P+	P	----	----	----	----	----	
Lytton	P	----	?	----	P	P+ss	P+	P	P	----	----	----	PPss	P
Lower Fraser	P	P	P	P	----	----	P	P	----	P	P+	----	----	P
Yakima	----	P	----	----	----	----	P	P	----	----	----	Rss	----	P
Measure of similarity	----	----	----	----	3.8	4.0	----	----	----	----	5.4	----	4.5	5.0

Group	Long, tapered pestles	Lucky stones (?)	Carved slate effigies, amulets, etc.	Ulna awls, elk or deer	Designs				Cordage		Bones (I, important; U, unimportant)					Digging-stick handle, conical hole	Wedges	
					Triangles	Circle and dot or pit	Zigzag	Ladder	2-ply Z–S single	2-ply S–Z single	Animal	Shellfish	Fish	Presence	Decorated		Antler wedges	Single bevel bit
Upper Columbia A	----	----	----	R	----	P	----	P	----	----	----	I	U	P	P	P	P	
Upper Columbia D	----	----	----	----	----	----	----	----	----	----	----	I	U	----	----	----	----	
Upper Columbia E	----	----	----	----	----	----	----	----	----	----	----	I	U	P+	P	P	P	
Upper Columbia C	----	----	----	----	----	----	----	----	----	----	----	I	U	----	----	----	P	
Dalles-Deschutes	----	----	P	----	P	----	----	P	----	----	----	----	I	----	----	----	P++	P
McNary	P	P	P	R	P	R	P	P	R	P	I	U	U	P	P	P	P	P
Wahluke	P	----	----	?	P	P	P	P	----	----	I	----	I	P	----	----	P	
Vancouver-Straits of Georgia-Juan de Fuca.	----	----	----	P+	----	----	----	----	----	----	----	----	----	P	P	----	P+	P+++

Thompson River	P	-------	-------	P	P	P+	P	-------	P	P	-------	-------	-------	P	P	-------	P	
Lytton	-------	P?	-------	-------	-------	P	-------	P	-------	P	I	U	I	P	P	-------	P	P
Lower Fraser	-------	-------	-------	P+	R	P	P	P	-------	-------	-------	-------	-------	P	-------	-------	P+	
Yakima	P	-------	-------	-------	P	P	P	P	P?	P?	I	P	P	P	P	-------	P	P
Measure of similarity	4.0	2.0	2.0	5.0	-------	-------	-------	6.0	-------	3.5	-------	-------	-------	-------	-------	6.3	-------	8.0

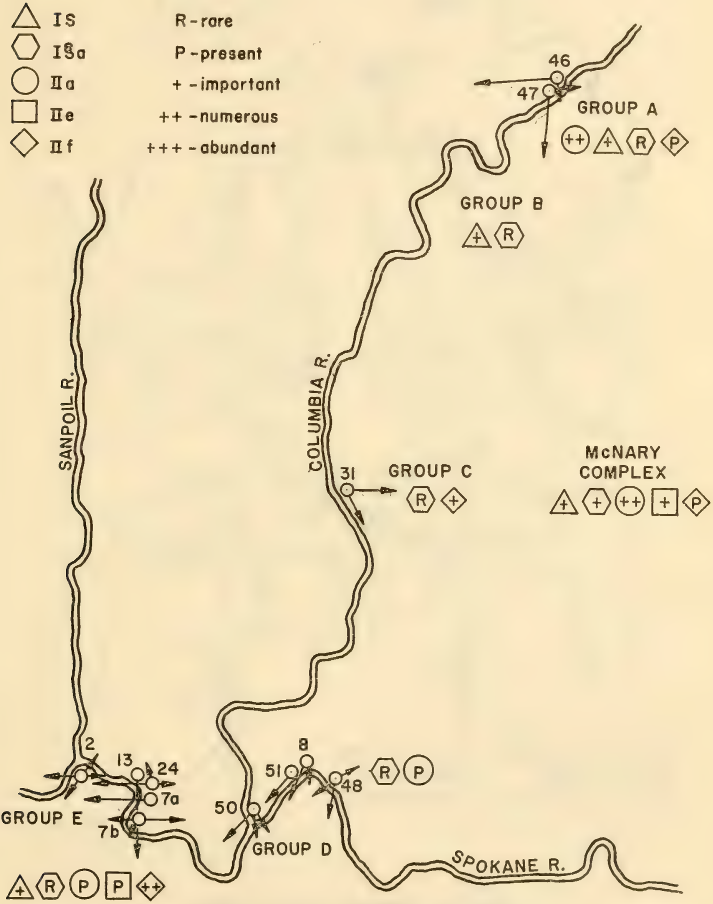
Group	Mallet pestles								1-hole bird bone whistle	Toothed bone flesher	Woodchuck or beaver teeth			Shell			Sinkers			Choppers	Quartzite spall knives	Grinding slabs for hopper mortars
	Presence	Bottle shape	Pear shape	Spool shape	Nipple top	Hat top	Plain top	Otherwise carved			Presence	Knives	Dice	*Haliotis*	*Glycymeris*	*Dentalium* (I, incised)	Rectangular	2-notched	4-notched			
Upper Columbia A	P	------	P	----	P	P	----	----	P	------	P	----	----	P	------	P	------	-------	------	------	P+	
Upper Columbia D	----	------	----	----	----	------	----	----	------	------	----	----	----	P	------	P	------	-------	------	------	P	
Upper Columbia E	P	------	P	P	P	------	P	----	------	------	P	----	----	P	------	P	------	R	------	------	P	R
Upper Columbia C	P	------	----	----	----	------	----	----	------	------	----	----	----	------	------	------	------	-------	------	------	P+	
Dalles-Deschutes	P	P	P	----	P	------	P	P	A	------	----	----	----	P	?	P++	------	P	P	P	-------	P+
McNary	P	P	----	----	P	?	P	----	P	P	P	P	P	P	P+	P+I	P+	P	P	P	P++	P
Wahluke	P	P	P	----	P	P	P	----	P	------	P	P	?	P	P	PI	P	-------	------	P	-------	
Vancouver-Straits of Georgia-Juan de Fuca.	P	P	P	P	----	P+	P	P	------	------	P	P	P	P	------	R	------	-------	------	------	-------	
Thompson River	P	P+	P	----	P	P	----	----	------	------	P	----	P	P	------	P+	------	-------	------	------	-------	
Lytton	P	P	P	P	P	P	P	----	------	------	P	P	----	P	------	P+	------	-------	------	------	?	
Lower Fraser	P	P	----	----	P	P	P	----	------	------	----	A	----	P	P	P+I	P+	P	P	P	P++	P
Yakima	P	P	----	----	P	------	P	----	------	------	?	----	----	A	------	R	------	P++	------	P?	-------	
Measure of similarity	----	------	----	----	----	------	----	6.7	4.0	1.0	----	----	4.5	------	------	7.6	------	-------	2.7	4.0	5.0	3.0

The site areas that come the closest to 45–BN–3 and 45–BN–53 with its 47 out of 55 artifact traits in table 24 are Lytton with 30, Yakima region with 28, Wahluke (geographically in the Yakima area) and the Vancouver-Straits of Georgia-Juan de Fuca-Fraser area with 25, and the Upper Columbia Group A with 24 (see map 12). In spite of the extensive work and excellent reporting done in the Dalles-Deschutes region, there is a very definite drop in the number of traits which it shares with the McNary sites as compared with site areas much farther away (Lytton). Thus, in spite of the fact that Wishram (and Spedis) was a great gathering place for the more mobile citizens of the aboriginal Plateau, it, and of course the lands down-river from it, maintained a cultural separatism from the Plateau that was strong indeed. Perhaps another set of traits would not stress this demarcation as strongly. That is a problem for the future.

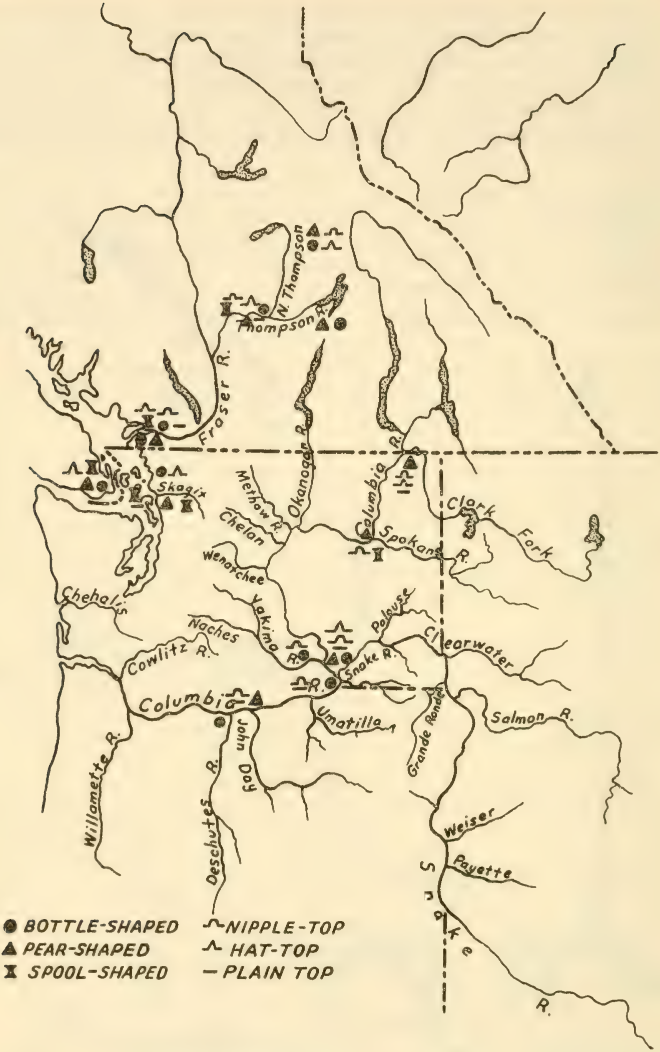
The small trait complexes within the list are several. That of the mallet pestles is one (eight traits); of digging-stick handles another (three traits); of shell (three), etc. The term "mallet pestle" has already been mentioned in part 1 (p. 63). The implements (pl. 21, *a*) were used widely in the Plateau and on the Northwest coast (map 13). They appear to have seen more use as a mallet in the south and interior (striking on the side of the body) and as pestles (striking on bottom) in the north (Smith, 1900) and on the coast, but were everywhere an implement of varied use. Consequently the somewhat elongate term. We usually speak of the objects as mallets in the field; they are hardly mauls.

To return to the trait complexes: there are in the mallet-pestle complex 12 site areas and 8 traits concerned. Thus 96 blanks exist. It all these blanks were filled, we would have identity in the complex, as it appears in the table, throughout the Plateau—leaving quantitative analysis aside. The blanks are not filled, we count those that are, and find 54. This, divided by eight (the number of traits), gives 6.7 as our measure of similarity throughout the Plateau for the mallet-pestle complex as herein expressed. Complete similarity, for the present purposes, identity would be 12 (8 into 96). The digging-stick handle complex gives a measure of similarity of 6.3 (3 into 19 filled spaces). The highest measure is from the simple antler wedge complex (8.0) as might be anticipated. It is closely followed by the shells used (7.6); mallet pestles, digging-stick handles, designs (6.0), celts (5.4) and quartzite spall knives, the carved bone or antler comb and ulna awls (5.0), etc.

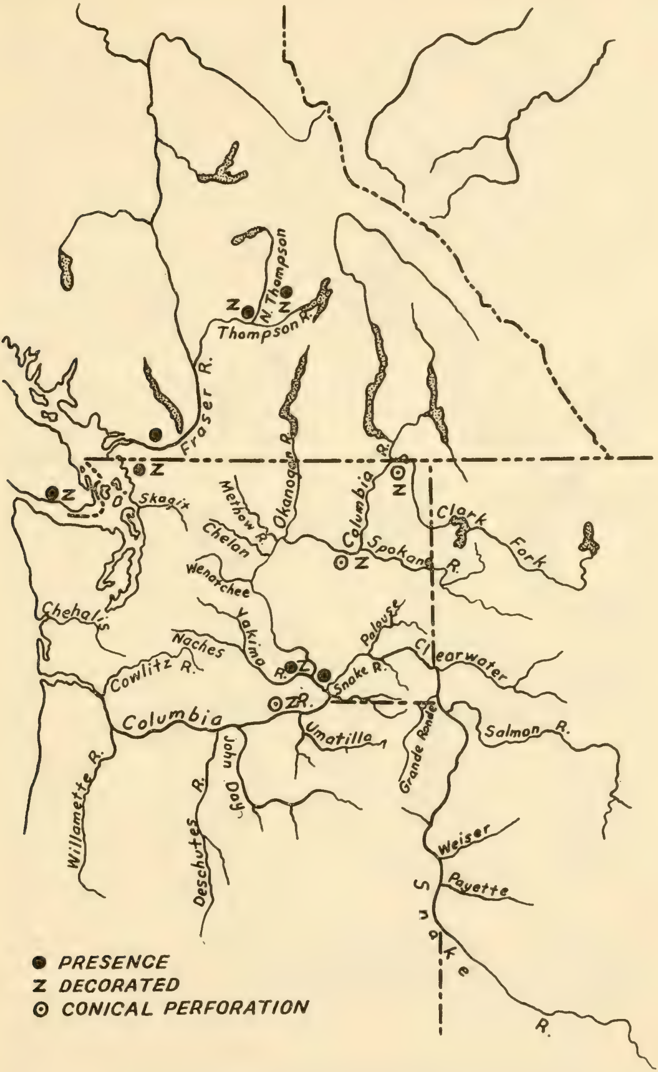
This spells out one thing: there is a flatness, a high similarity in even the more complicated groupings of traits, like mallet pestles and their forms, throughout the Plateau. The cultures of the area, from an archeologically analytical point of view, fall into one pattern. It had not been anticipated that there would be other than the presence of these particular artifacts registered from opposite ends of the Plateau—yet, as a glance at the table will show, there is more than that. True, these are rather spectacular artifacts and as such would command and benefit by a greater interest and more thorough description in the reports. Something of the same stands out with the


IS
ISa
IIa
IIe
IIf
R - rare
P - present
+ - important
++ - numerous
+++ - abundant
46
47
GROUP A
++
+
R
P
GROUP B
+
R
COLUMBIA R.
SANPOIL R.
31
GROUP C
R
+
McNARY COMPLEX
+
+
++
+
P
2
13
24
7a
7b
GROUP E
50
51
8
48
R
P
GROUP D
SPOKANE R.
+
R
P
P
++

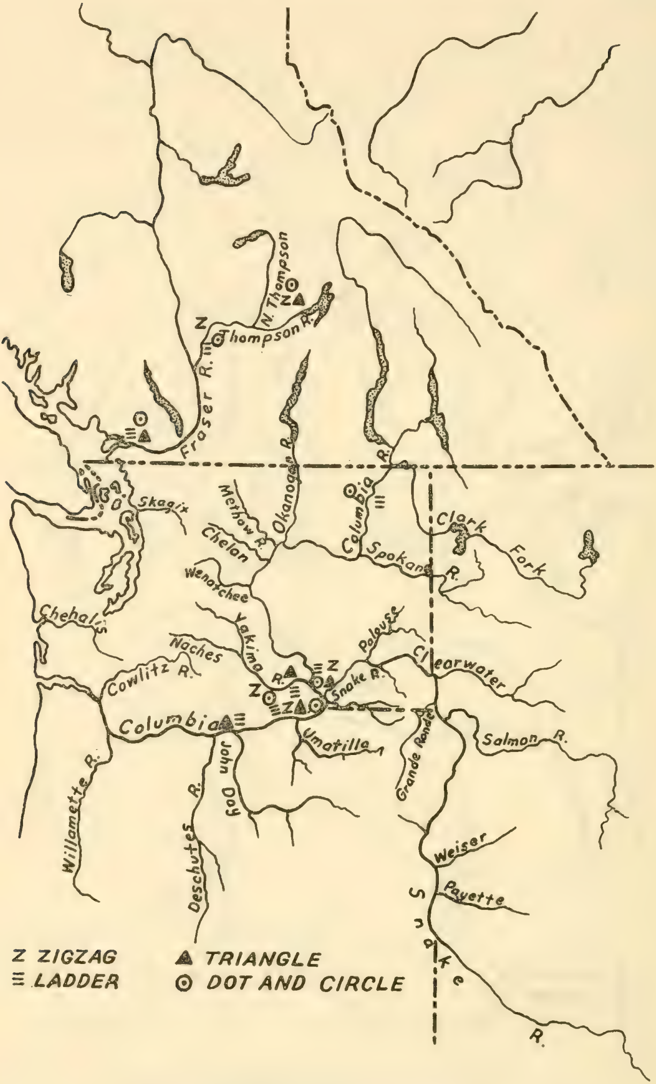
Map 12.—Upper Columbia burial orientation and distribution of McNary complex projectile points and knives.


N. Thompson
Thompson R.
Fraser R.
Skagit
Methow R.
Okanogan R.
Chelan
Columbia R.
Spokane R.
Clark Fork
Wenatchee
Yakima R.
Chehalis
Naches
Palouse
Clearwater
Cowlitz R.
Snake R.
Columbia
Umatilla
Grande Ronde
Salmon R.
John Day
Deschutes R.
Willamette R.
Weiser
Payette
Snake R.
● BOTTLE-SHAPED
▲ PEAR-SHAPED
⧗ SPOOL-SHAPED
NIPPLE-TOP
HAT-TOP
— PLAIN TOP

MAP 13.—Distribution of mallet pestles.


Thompson R.
N. Thompson
Z
Z
Fraser R.
Z
Z
Skagit
Methow R.
Chelan
Okanogan R.
Columbia R.
Z
Clark Fork
Spokane R.
Z
Wenatchee
Chehalis
Naches
Yakima R.
Z
Palouse
Clearwater
Cowlitz R.
Snake R.
ZR.
Columbia
Umatilla
Grande Ronde
Salmon R.
Willamette R.
Deschutes R.
John Day
Weiser
Payette
Snake R.
● PRESENCE
Z DECORATED
⊙ CONICAL PERFORATION

Map 14.—Distribution of antler digging-stick handles.


N. Thompson
Thompson R.
Fraser R.
Okanogan R.
Columbia R.
Skagit
Methow R.
Chelon
Wenatchee
Clark Fork
Spokane R.
Chehalis
Yakima R.
Naches
Palouse
Clearwater
Cowlitz R.
Snake R.
Columbia
Umatilla
John Day
Salmon R.
Grande Ronde
Willamette R.
Deschutes R.
Weiser
Payette
Snake R.
Z ZIGZAG
≡ LADDER
▲ TRIANGLE
⊙ DOT AND CIRCLE

MAP 15.—Distribution of decorative motives.

shells; all that have been listed are aboriginal trade goods, marine shells. This trade must have flowed rather evenly throughout the region. We have historical evidence that it did.

Another fact is highlighted in table 24. That is the cultural poverty of the Upper Columbia. The quality of the archeological research there appears to have been of the best, although the investigators were continually beset with difficulties, so there is not the question of elective reporting that comes to mind in other situations. Even were the four areas of the Upper Columbia, as the region has been divided here, merged there would be small change in the tabulation. It is a poor area when compared to the Thompson-Fraser drainage or to McNary. Map 13, showing mallet-pestle distribution, illustrates some of the previous points rather well. Simplicity, perhaps even poverty, exists along the Columbia as compared to the Fraser. I do not believe that this is wholly the result of more extensive work in the north. Too, some of the facts of relationship between the northern Plateau and the Puget Sound and north are here illustrated, although it is too early to assess this situation. Smith (1906, p. 290) thinks that there was fairly extensive contact between Coast and interior in the distant past, but that since then the two areas have developed along distinct lines. The possibility that the circle and dot design is wanting in early horizons in the Vancouver-Straits of Georgia-Lower Fraser region (and Smith, 1906, p. 291, states that it is) might well mean that it came into both Plateau and Coast late, probably from the north. Speculation on this point is not useful, as Smith may not be correct and little or nothing has been done in the Plateau in horizons that are as early as some of Smith's coastal material. It is unfortunate that several coastal sites, both Washington and British Columbia, have not been excavated—or that those which have been dug have not been described.

It is true that the more spectacular areas have drawn archeologists, so, perhaps, with the most digging having been in the most productive regions one is partly justified in treating the data as if an adequate sample were present. If this were so there would be a trailing out of any or all traits as we leave areas of heaviest study. Of course, the future, always treated with reverence by archeological writers, can be expected to bring forth new information.

Map 14, showing the archeological distribution of the digging-stick handles, does suggest that this complex varied little throughout the Plateau. The absence of information on the perforation is presumably an oversight in description. The simple handles have not been contrasted with the bow-shaped handles of the north in the map.

Map 15 showing the archeological distribution of certain simple decorative motives, indicates a lack of these in The Dalles-Deschutes area and a somewhat greater use of them in the north. In The Dalles area carving in the round has probably obscured the less sophisticated decorative effects as far as collecting and reporting go. The same may be partly true in the north. In the McNary area and immediately above, on the other hand, ladders, zigzags, etc., were household motives, so to speak. The Upper Columbia does not show too well here but it will be recalled that some intriguing bone carving came from that region.

It could almost go without saying that the blanks in the trait list in the categories of the cruder tools reflect as much a lack of interest in them as they do a change in types. That the latter has come about, however, cannot well be doubted. The McNary survey showed fewer net sinkers of the chipped-notched varieties as one worked upstream. They were almost rare in the Upper Columbia. In all likelihood there were fewer long nets or seines and more weirs and hand nets, as streams became smaller and rapids more frequent. Net sinkers were side notched instead of end notched more generally in the late Dalles-Deschutes (Strong et al., 1930, p. 88) and on the coast. This too, must reflect a slight change in fishing techniques.

Choppers and spall knives or flakes are seldom noted as to absence or quantity in the early reports.

It is worthy of special note that Krieger (1928 b) at Wahluke found a much more extensive artifact complex than was found at 45–BN–3 and 45–BN–53. Among the tools present at his site and putatively absent below were basalt saws and wedges, a spindle whorl (?), spades, obsidian ceremonials (obviously trade from southern Oregon), granite rollers (?), bone clubs, chisels of nephrite, two- and three-point chipped compasses (?), stone weaving implements (?), antler and bone weaving implements (awls ?), rib fillet (?), slate knives and points, quartzite clubs, beaver teeth pendants (?), bone and horn bow sections, horn spoons, porcupine quilling, bone wedges, feathers, extensive woven remains, decorated long pestles, and many other less important items. He states that the dog was kept to furnish wool, a statement for which one wishes he would publish background data—both dog and mountain-sheep hair are mentioned (Krieger, 1928 b, p. 12). He also notes that it is peculiar that wood would remain undecayed in the grave when the framework of the houses was not present. Unless the wood were charred in cremations, I believe this to be a very good point. It reinforces the position taken in this report; i. e., that there was little or no framework remaining at a pit when the lodge was abandoned.

Krieger has several point types that were absent at McNary. Strangely, he did not report notched sinkers, spall knives, long chipped knives, the toothed flesher (possibly his site was too early for the latter). As a full report is lacking, extensive comparisons are not too useful. Trade goods were apparently absent and neither horse nor bison bones were found.

A problem which Krieger (1928 b, p. 138) has opened is that of a suggested termination of the use of copper and an increase in bone tools near Page, Wash., on the lower Snake River. River Basin Surveys have not found evidence of this in their surface collections.

THE ARTWORK

If factual material has been thin in other aspects of the archeological record of aboriginal life of the Plateau, it is even more so in the artistic. For that reason there will be given here only a few of the more salient points concerning decorative activity. They will revolve around the McNary complex and will be, generally, simply leads for further work.

First, it should be pointed out that the pit and circle or dot and concentric circle, or sometimes the pit or dot alone is widespread in the Plateau. Its prehistoric distribution, with a certain attempt at evaluation, appears in table 24 and map 15. This is, of course, an old and widespread design in the north. It is also a very simple one and, being so, should not be given undue emphasis to support any speculative structure. Smith's analysis of this decoration has already been given. My sentiments are that his statements rest on insufficient evidence and if two or three sites are excavated along the Northwest coast down into southern British Columbia, yielding examples of this design and of the ticked line throughout or in the lower levels, there can be no hesitancy in proclaiming a definite continuity and relationship throughout the area in the field of artistic development. The ticked line, both single and double, appears at least as far south as the Washington coast. Plate 24, *b*, illustrates the incised designs on the *Dentalium* shells of 45–BN–3. They are zigzags and hachured zigzags. Ladder designs, series of parallel short cuts, were not unusual on the bone beads at 45–BN–3: this item's spread is tabulated also. Incised decoration on digging-stick handles cannot be described because of the disintegrated condition of the surface of the tools. They appear to have sported simple lines and hatched areas. The shaping of the mallet pestle, the pipes, and the incised spoon (pl. 19, *b*, 7) and the herring-bone or fir-tree or skeletal designs on the carved slate objects about complete the list. The only attempt at realism is the carved slate found with burial 26 (pl. 20, *a*, 25). There was a surprising lack of carved bone and antler.

With the exception of the last statement and an absence of the amulets, the complex fits the finds in the Upper Columbia from the Coulee Dam north. Not so, however, are conditions along the Lower Columbia. Here wood carving is known as having flourished historically. Stone carved images and decorated objects have filled collections in the area. The amazing antler carvings that Strong (1945) has described and the extension of this art form into the Middle Columbia (Smith, 1904, and 1910, p. 133) certainly call for comment.

As far as I can see, there is identity between the primary motives of these carvings and several other forms of expression. Strong (1945) pointed out the petroglyphs and pictographs which illustrate the human face with a halolike headdress. He has also demonstrated a definite relationship to some of the larger rock carvings and paintings. The excavation of a house cellar some years ago in Umatilla brought forth, among other things, a large flat bone or antler carved in the likeness of a human figure. It was broken and discarded. The description fits the type of Strong's carvings. To this I can add here only my own material, which is indubitably more conventionalized than the preceding, and point to a woodcut of some spirit boards (?) in the Wilkes narratives (1845, vol. 5, p. 128). There the board on the right has a headdress that is identical with that which has appeared on the antler carvings and petroglyphs. The next board is similar. The petroglyphs have been the best illustrated (Strong et al., 1930, pl. 28, *b;* Krieger, 1927, fig. 187, p. 190; Smith, 1910, plates passim). I should add that I see no need of calling forth a ghost cult (Strong, 1945) to explain the skeletal attributes of much of this part of aboriginal art. The Northwest Coast Indians, to stay close to home, employ such designs in many of their figures and, as far as I am aware, stress ghostliness or death only in a few of their more esoteric ceremonials.

As far as the McNary material is concerned, there seems to be little that is pertinent for a discussion of these artifacts. Many of the Sauvies Island stone carvings (Strong, 1945; Steward, 1927, p. 259, fig. 1) are reminiscent of our 45–BN–3/B 26/553. One of these, No. 4001, Portland Historical Society (a large stone carving in basalt, illustrated several times (Smith, 1907, fig. 196)), manifests a similar treatment of the eyebrows, nose outline, and of the ribs; the hair or halo, on the rear of the McNary figure only, is formed in the same way. Terry (1891; see pl. V, side view) has illustrated several animal or human carvings, fancifully called ape heads, from the John Day area of the lower Middle Columbia. There the handling of nose and eyebrows and of the ribs again appears to combine two of the outstanding motives of the bone and antler and stone carvings under discussion. The painted Salish spirit figures illustrated by Gunther (1951, 5th page, second set of plates) are, as far as design units and style go, so similar that they can only be part of the same artistic complex.

To return to Strong's thesis of an early ghost cult on the Columbia—with the above proviso, that delineation of ribs or viscera in other art styles does not mean that which it would in ours (death or, perhaps, butchering)—his argument carries weight. Had he had the 45–BN–3 data at hand I am sure that they would have fitted well. I am not prepared to accept his thesis and, for the present, still prefer the Teit-derived theory that the figures or figurines are connected with the Guardian Spirit complex. It is interesting that Strong published his paper during the period when the Buzzard or Death cult of the Southeast was being so thoroughly discussed. Other than the one figurine from burial 26 the motives employed are distressingly simple. They have been called herein (see the descriptive section p. 65, ff.) a headdress and herringbone or rib designs. Both are like the fir tree so commonly seen in American rectilinear art, which Teit (1909) calls a rib and backbone design. Heizer (1947, p. 291) has called attention to some incised slate tablets from Kodiak Island. There are some in his collection which are rather similar to the herringbone incised 45–BN–3 objects. He has also shown me drawings of larger painted stone tablets from Napa, Calif., which also appear to fit into the same picture. Closer to home, there are several of the objects so similar as to fit into the same series in a collection from the vicinity of Celilo, Wash., that is now in the Washington State Museum. Widespread use and continuous distribution of these objects is most probable.

Krieger (1928 b, p. 5) states that more wood and more curvilinear design elements were used in the Lower Columbia and that stone, bone, and antler and rectilinear forms characterized the Upper Columbia. As far as materials go, he cannot well be wrong, but some of the finer pieces which he illustrates are curvilinear on antler and on shell (Krieger, 1928 a, p. 137). They bespeak perfect familiarity with design form and material and employ both mass and line, whereas the McNary material uses only line in its execution. There is no reason to consider them trade pieces. As is shown in table 24 the usual simple design forms of 45–BN–3 appeared at Wahluke (chevrons, ladders, zigzags).

Actually it will probably be necessary to conduct a careful examination of collections, private and in museums, before an adequate survey of the art forms of the area can be made. There are not enough data on most of these collections so that an investigator could assign them to horizons or generally to specific sites, but I believe that the data will support gross areal treatment such as is being used here. Many of the best sites in the Columbia Valley (where the best sites were) have been removed by floods and commercial collectors. The remaining collections as well as sites must be studied exhaustively before we will be justified in summing up Plateau art much more than has been done. The summary by Strong et al. (1930, p. 145) is still one of the best.

PROJECTILE POINTS

The point classification used in this report has been employed, where necessary for descriptive purposes, in the following pages. Projectile points have never shown themselves to be as sensitive cultural indicators as have, for example, ceramics. Many attempts have been made to do large-scale comparative studies of point types, but they have always, practically speaking, come to grief. Yet, there can be no doubt that certain of the chipped artifacts are reliable horizon- and cultural-typology indicators. One need only mention the remarkably constant early dart point types or, for the Southwest, the small triangular, often side-notched point, of Pueblo III and later, or, for the Southeast, the same type of the Upper and Middle Mississippi. There can be small doubt, however, that, to thoroughly study the points of a large area, one should have full collections and much space at hand in which to manipulate the objects and data.

Failing this in the present situation it has been logical to go to the only area other than McNary in the Plateau where modern excavation and analysis has been carried out—the Upper Columbia-Grand Coulee Reservoir (Collier et al., 1942). The Dalles-Deschutes work (Strong et al., 1930) is not wholly Plateau, nor was the work as extended. Working with the Upper Columbia (published) material, I have attempted to reduce the projectile point classification used there to that of 45–BN–3 and 45–BN–53. From there the study has proceeded to other regions of the Plateau where a sufficient collection has been gathered to make an analysis profitable. It is fully realized that working from figures and illustrations and transferring one typologic-naming system into another is flirting with a dangerously large error. It would seem, however, that the method here followed is better than the reverse: using another system and fitting the McNary points into it. The personal error would mount there—at least one knows his own collection. Too many of the reports (especially Smith's) used no descriptive system and so gave no percentages. In table 25 percentages of the various types in the Upper Columbia, Dalles-Deschutes, 45–BN–3–45–BN–53, Roaring Springs Cave (Cressman et al., 1940) and other areas are compared. It was not possible to give percentages in most of the columns, as the sources do not contain necessary evidence. It was therefore necessary to use P (present) and plus signs to indicate profusion. R indicates rarity.

Sites in the Upper Columbia, as is also noted in the discussion of the burials, fall into five distinct geographic groups—a fact which may have ethnologic significance (map 12). These groups are as follows: Group A, sites 46 and 47 both with historic trade material (H); Group B, sites 35, 36, 38, 41, 43, 44, 45, and 49, all of which lack trade goods and are in the questionable category; this group has consequently been assigned to the prehistoric (P) for the purposes of the analysis; Group C, sites 31, 33, 34, 39, 40, and 42 are all P or ? and have been assigned to P; Group D, sites 8, 48, 50, 51; site 50 is prehistoric, all others are historic; Group D is not considered in the following tabulations, as only two points were found in the sites; Group E, sites 2, 3, 4, 5, 7A, 7B, 11, 12, 13, 22, 23, 24, 25, 29, and 30; sites 11, 22, 23, and 25 are prehistoric, all others fall into the historic division.

Because so many of The Dalles-Deschutes illustrations and figures depend upon the Gammon collection, one cannot take a complete sum of their various types and compare them with the McNary or Upper Columbia series. This collection then was first eliminated. It then seemed proper to break the remainder down into the Wakemap Mound (both pits), the modern or contact period as with historic (H) above (sites 14, 20, 21) and the artifacts which had no association with contact material (P) from sites 18 and 19. Roaring Springs later horizons are all prehistoric (P); here, of course, percentage evaluation will be given.

The results of this method appear, as has been mentioned, in table 25. An examination of the tabulation does not reveal much in the way of startling information. Group A of the Upper Columbia is, as far as mass comparisons of the complexes (simple addition of the percentages gives this) are concerned the most like the 45–BN–3 and 45–BN–53 material. It must be noted that we can, in table 25, compare only those types that are found in both areas. Group A is historic. Next, in similarity of complex mass is the Bertelson collection, then Wakemap Mound, the Thompson River collections, Wahluke and Roaring Springs, Dalles-Deschutes (H), etc. Individual trait comparisons, that is a totaling of closeness of percentages for individual types show Group C (P) and Group A (H) standing closest to the McNary series. This suggests a conformity of complexes but a shift of preferred types within the Upper Columbia and between that region and McNary. In other words, the complex of points with which we are dealing is old but one can expect shifts of emphasis within it. These shifts are areal and will also presumably be chronologic, although such have not yet been isolated. It is hoped that we will have data on this from McNary at the end of another season. The Thompson material, not expressible numerically, is probably as close to the McNary as is the Upper Columbia material, or more so. The types which show the greatest interareal percentile agreement are II e (SAb, SAa), II c (SBa, SBb), II a (NB series), and I kb (NA).

TABLE 25.—*Projectile point distribution (percent)*

Group	Type											Complex mass (percentage of whole complex here represented)
	I kb (NA, NAa)	I s (NAb$_2$)	I k (NBb$_1$)	II b	I ka (NAb$_3$)	II a (NBa, NBb, NBb$_2$)	I sa, I sb, I kc (NC)	II e (SAb, SAa)	II c (SBa, SBb)	II fa (SCB$_2$, SCb$_3$)	II g (basal notch)	
McNary	3	4.5	16	2.7	3	16.5	19	2.7	5.5	2.7	22	94.9
Upper Columbia Group A (H)	4	10	8			46	2		6	4		80.0
Bertelson collection	1	R	2		R	41	R	13	14	R		71.0
Dalles-Deschutes Wakemap Mound	1.5			P	0.8	4.5		21	26	12.3	P?	66.1
Thompson R.	P++				P+	P+++		P	P++			
Wahluke		P		P	P	P+	P		P	P	P	
Roaring Springs		8.9				8.9			1.7	12.9	27	59.4
Dalles-Deschutes (H)	2.5			P	12.5	2.5		.5(?)	17.5		P	35.5(?)
Upper Columbia Group C (P)	2.6	2.6	2.6				2.6	2.6	7.8	15.6		36.4
Upper Columbia Group E (P)						6			2	28		36.0
Cattle Point (Developmental)	8						15			8	4	35.0
Cattle Point (Maritime)	4					6	14				2	26.0
Upper Columbia Group E		2.8				2.8		2.8	11.2	5.6		25.2
Cattle Point (Late)							25					25.0
Cattle Point (Island)	11				6		6					23.0
Upper Columbia Group B (P)	2	2				1			3	7		15.0
Yakima	P				P			P		P		
Gold Hill		P				P						
Vancouver-Juan de Fuca-Fraser	P	P					P?					
Lytton	P		P			P						
Dalles-Deschutes (P)				P		2.4		4.9	2.4	7.3	P?	17.0

The interpretation is that the closest similarities between complexes exist within the latest material from the Upper Columbia, Dalles-Deschutes, and from the Wakemap Mound (Chinook or Tenino?) in the Deschutes area. The Thompson River material has a similarity, subjectively attained, which is not surprising but is in a way gratifying. The Plateau complex is going to be, it seems, widespread, and, while not static, in no way subject to rapid change. More excavation will, of course, bolster or shatter this judgment. Of interest is the close alinement of the late Roaring Springs (south-central Oregon) and McNary types. This is largely because of the prevalence of the basal notched, typical "Columbia River arrowhead" outline of so many of the Basin points from the Roaring Springs site. I refuse, now, to do more than hazard a guess as to whether this coincidence is fortuitous or significant. My guess is that it is the latter, and that there was once a far closer relationship between northern Basin and Plateau cultural facies than now appears.

The Cattle Point complex (King, 1950) and material from the Bertelson collection (Smith, M., 1950) have been used for comparative purposes. A quick glance at the projectile series from Cattle Point, divided as King has divided his material, indicates none of the similarities that have been noted except in the simple (NC) series, where, peculiarly, there has heretofore been small agreement. The three latter Cattle Point phases come surprisingly near to the McNary 19 percent in this one rubric. This is incidentally one of the groupings in the McNary classification that is the least trustworthy. King's conclusions (1950, pp. 22–23) are essentially the same as the results given here and follow the older ideas of Smith. While the Bertelson collection shows no individual agreements it does, in the large, come the second closest to the McNary series in its use of similar forms; i. e., it has a closer congregation of all of its projectile points around the McNary types than has any other collection except that of Group A (H). The few points by which it differs from the Upper Columbia area cannot be too significant in an analysis of this type.

After an examination of the Cattle Point collection, as a whole, little was expected in the way of a coincidence in the point types. King was obviously working in material which completely lacks, as far as can be seen, the Plateau flavor—as do Smith's Fraser collections from only a short distance away. The congregation of the Bertelson material around the favored McNary types did, however, come as a surprise. With no more than M. Smith has to offer in the way of supplementing information, one does not care to speculate. There can be no doubt that coast cultures influenced Plateau, and vice versa. Northwesterners were ever great traders. Perhaps the Bertelson material represents Plateau-Coast interinfluences, or, perhaps it is basic. Beyond that one cannot go. It is neither proper nor modern archeology to construct a culture history on the basis of a few tool types as M. Smith has done.

In general, coincidences in percentages of types were confined to the simpler types—fine or crude execution aside. Obviously this indicates rather simple and nonspecialized complexes—and that the simpler, the often greater agreement. All of this fits in rather well and shores up a long held hunch that simplicity and widespread similarity are twin watchwords for much of Plateau (material at least) culture.

As a last megascopic check, map 12 illustrates the types as they appear to stand in relative importance in the Upper Columbia as against a similar ranking for McNary. The result appears to be less accurate than were the attempts toward a more detailed analysis. As before, the Group A is most like the McNary—a fact which validates both methods of presentation. But, there is certainly a lack of sensitivity about the results from the more subjective mapping method which reinforces a feeling of reliance upon the more detailed tabulations. Were it possible to classify other investigators' collections from publications on the same level of objectivity as the McNary material was typed, there might have resulted high interareal correlations. As it is, there is just enough correlation and result to make one feel that solid ground is underfoot.

I am at somewhat of a loss to explain the lack of or low percentage of the II g type in so much of the Plateau. Site 45–BN–3 had a healthy percentage (22) of these basally notched points (the typical Columbia River jewel point when made of fine agates, etc.). Smith has reported what can be assumed to be this type as trade items in the Puget Sound area (Smith, 1900, p. 564), but he did not figure it for the Yakima region (1910). The presence of the form south of the valley in Roaring Springs Cave in a slightly higher percentage than in 45–BN–3 and 45–BN–53 may be pertinent.

Smith's observation that more agate and finer chalcedonies were used for points in the south and that coarser basalt and glassy basalt were more often employed in the north might have a bearing on this. The preferred southern materials (if Smith's observation is correct) while difficult to work and splintery, will take finer work and yield a more attractive piece than the more easily handled, coarser but nearly as efficient basalt. The availability of agates in the Middle and Lower Columbia is well known. Most comparisons of preferred materials, from area to area, are vitiated by the lack of terminology or understanding of the petrologic problems involved. Some archeologists lump and some split. Herewith is given the materials categories of the 45–BN–3 and 45–BN–53 and Upper Columbia collections (table 26), the only two that are comparable or have been classified with an eye to material. It can readily be seen that a too close classification may defeat its own purpose. When the McNary classification was described a published standard was not used as should have been done. The need that one man or laboratory should handle material in which the subjective factors play such a part in segregation is again apparent. Areal laboratories, permanent staffs, and close cooperation are desiderata of the greatest importance.

TABLE 26.—*Materials—chipped stone points*

Material	McNary		Upper Columbia	
	Number	Percent	Number	Percent
Petrified wood	22	47		
Chalcedony	10	21	440	82
Basalt	1	2	58	11
Chert	4	8		
Flint	7	15		
Quartzite	2	4		
Obsidian	1	2		
Argillite			38	6
Opal			4	8

Little similarity exists here. Even if McNary flint, chalcedony, and chert were lumped under chalcedony, the percentages would not approach. The petrified wood of McNary and the basalt and argillite of the north are outstanding differences. The basalt tools may or may not form a complex but apparently the use of that material is an important cultural trait and one which points to the north. Smith (1899, p. 136) stated that, in the Lytton area, at that time, Indians still chipped points of basalt. Although not yet examined in the laboratory, it is fairly certain that we have field evidence for the earlier use of basalt in the Columbia. It apparently gave ground as a preferred material for points and knives to the agates and chalcedonies in the south, but continued in use in that section where it has also been found to be outstanding archeologically—the north. Its loss of position in the south may be traceable not only to the greater attractiveness of the materials but to an influence from the Basin, during a period when there was greater similarity between the two areas than there has been in modern times. Middle Columbia materials, as reported by Krieger (1928 b, p. 13), were more like McNary and Lower Columbia than the Upper Columbia.

A surprise has been the relatively unimportant bone complex in McNary. This might have been attributed to an accident of preservation or salvage had not Smith (1910, pp. 27–28) made the same observation for his Yakima area. Here he noted a lack of spear and arrowpoints of bone and contrasted this with those parts of the northern Plateau with which he was familiar. The same contrast may be made between sites 45–BN–3 and 45–BN–53 and the Upper Columbia. Here Collier and his coauthors report a far better rounded bone complex than we found in the Middle Columbia in 1948. Spinden (1908, p. 189) is able to describe a fairly rich bone complex for the Nez Percé. This similarity or putative relationship with the north and coast is one of the reasons for considering the Nez Percé culture to have retained rather more of the older, now northern Plateau (or Lower River?) elements and to be still closer to an earlier phase of northwestern culture than many of the less peripheral Sahaptin.

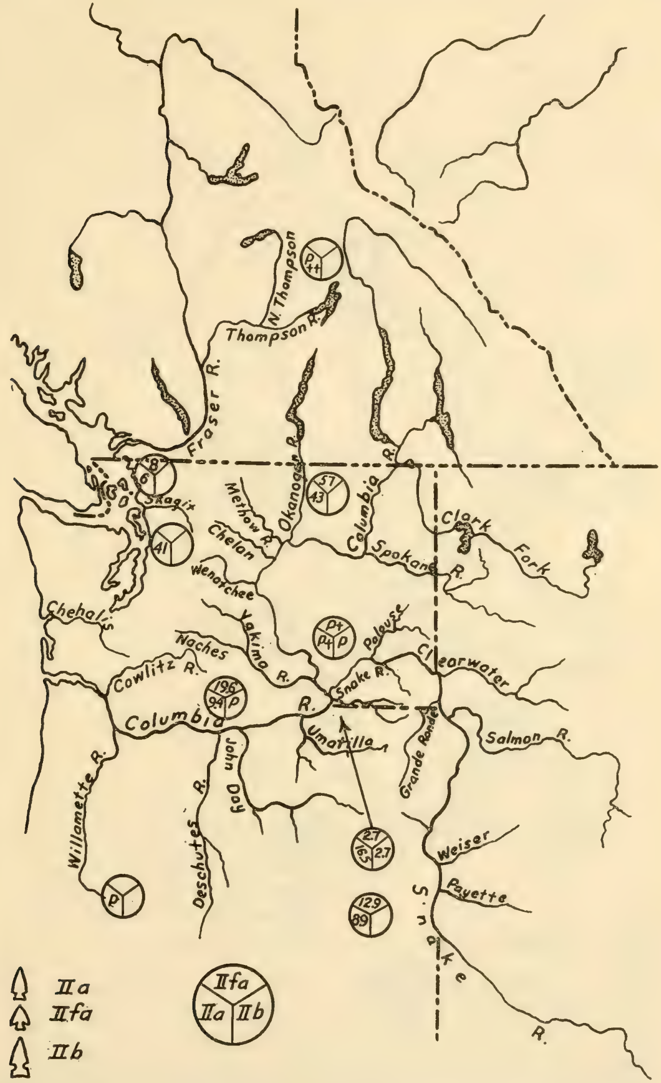
Maps 16 and 17 show graphically the information contained in table 26. On the maps appears a preference for the simpler I kb and for the side-notched points. This may be in line with the remarks made above under "materials." Basal-notched points II b and II g are southern. The long knife is confined to McNary and the Upper Columbia.

ARCHITECTURAL TRAITS IN THE PLATEAU

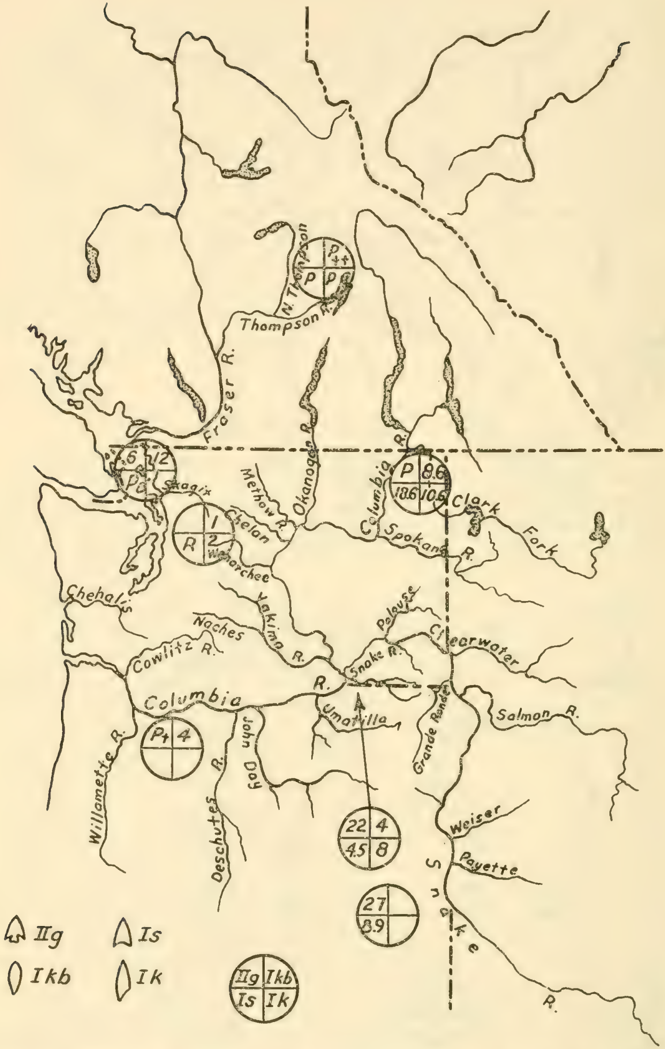
(Maps 18 and 19)

While this section is written largely from the archeological viewpoint, there is not, nor can there be, an actual separation of the ethnographic archeologic data. In the following remarks and presentations an attempt has been made to use both to tell a part of the story of man and culture in the area.

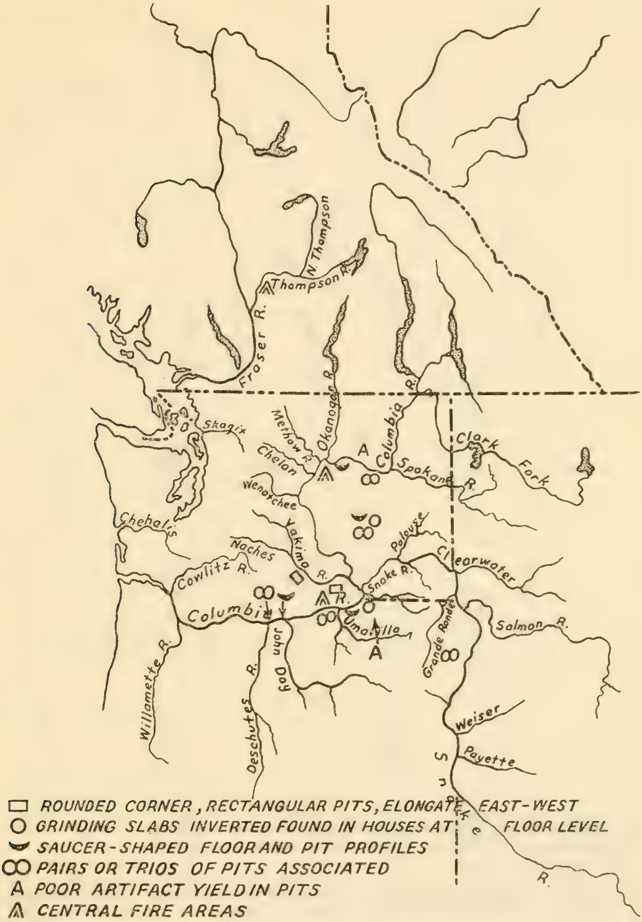
In spite of the fact that the true, semisubterranean pithouse is often given as a cultural attribute of the Plateau as a whole, there is actually small reason for doing so. Ray records the permanent, classic pithouse from the west (Klickitat, Tenino, Kittitas) and from the north and north-central parts of the Plateau (Wenatchi, Sanpoil Shuswap, Lillooet) (Ray, 1942, pp. 177, 3707 seq.) The Umatilla did not claim it and I believe, from the work so far done, that their neighbors could not. Dawson (1892, p. 7), after describing the deep pithouses of the Shuswap and their large permanent villages in the warm valleys, observes that there was a great paucity of residences of that kind (true pithouses) in the Okanogan country and that it would seem that the deep houses were hardly used there. Teit (1930, p. 331) says that there were two types of underground houses and that the principal distinction between the two was side entrance and top entrance. The former was northern and the latter southern in the Columbia Valley. The latter, it appears, may have been the impermanent type that we are finding archeologically. The two types, he states, met in Okanogan territory. Teit goes on to indicate that the underground house may have been used only rarely by the Kalispel and Lower Spokane; that the Colville had not used them since 1800, and it was doubtful if they had ever used them. Kane (1925, pp. 189–190) describes a true


N. Thompson
P++
Thompson R.
Fraser R.
8
6
Skagit
41
57
43
Methow R.
Okanogan R.
Columbia R.
Chelan
Wenatchee
Clark Fork
Spokane R.
Chehalis
p+
p+
P
Palouse
Naches
Yakima R.
Cowlitz R.
19.6
9.4
P
Snake R.
Clearwater
Columbia R.
Umatilla
Grande Ronde
Salmon R.
Willamette R.
Deschutes R.
John Day
2.7
16.5
2.7
Weiser
Payette
P
12.9
89
Snake R.
IIa
IIfa
IIb
IIfa
IIa
IIb

Map 16.—Percentage distribution of stemmed projectile points. Figures in circles are percentages of mapped types; *P* indicates presence.

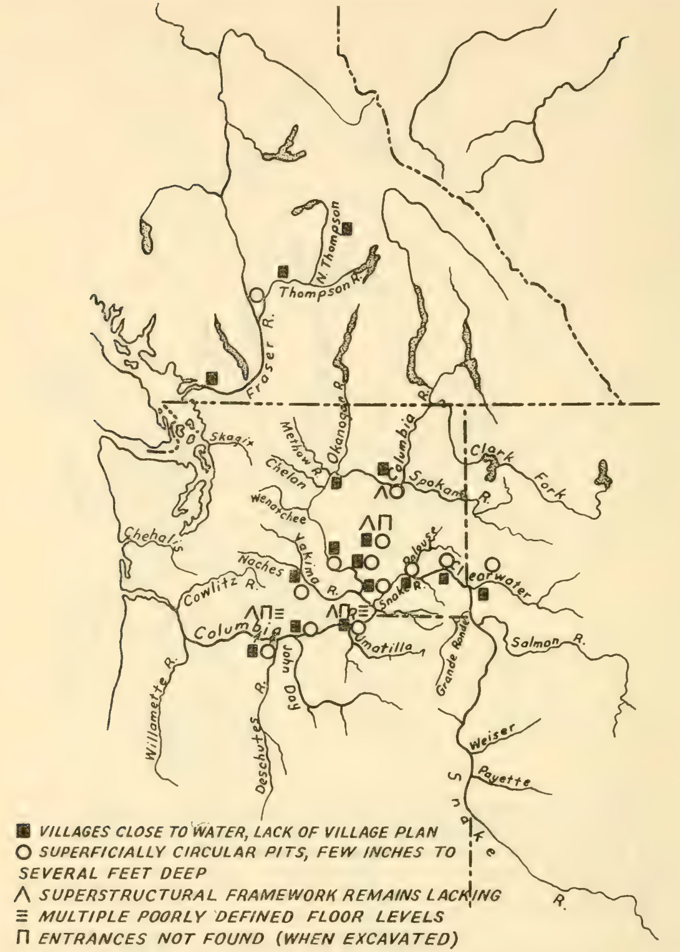

N. Thompson
P+
P
P
P
Thompson R.
Fraser R.
Okanogan R.
Columbia R.
Methow R.
6
12
P
Skagit
1
R
2
Chelan
Wenatchee
P
8.6
18.6
10.6
Clark Fork
Spokane R.
Chehalis
Naches
Yakima R.
Palouse
Clearwater
Snake R.
Cowlitz R.
Columbia R.
Umatilla
Grande Ronde
Salmon R.
P+
4
Willamette R.
Deschutes R.
John Day
22
4
4.5
8
Weiser
Payette
27
8.9
Snake R.
IIg
Is
Ikb
Ik
IIg
Ikb
Is
Ik

MAP 17.—Percentage distribution of stemless points and knives, and basal-notched point (II g). Figures in circles are percentages of mapped types; *P* indicates presence.


N. Thompson
Thompson R.
Fraser R.
Okanogan R.
Columbia R.
Skagit
Methow R.
Chelan
Wenatchee
Clark Fork
Spokane R.
Chehalis
Yakima R.
Naches
Palouse
Clearwater
Cowlitz R.
Snake R.
Columbia
Umatilla R.
Grande Ronde
Salmon R.
John Day R.
Willamette R.
Deschutes R.
Weiser
Payette
Snake R.
A
▭ ROUNDED CORNER, RECTANGULAR PITS, ELONGATE EAST-WEST
○ GRINDING SLABS INVERTED FOUND IN HOUSES AT FLOOR LEVEL
◡ SAUCER-SHAPED FLOOR AND PIT PROFILES
∞ PAIRS OR TRIOS OF PITS ASSOCIATED
A POOR ARTIFACT YIELD IN PITS
Ⓐ CENTRAL FIRE AREAS

MAP 18.—Distribution of various architectural traits (*continued on map 19*).

flat-roofed pithouse for the Walla Walla (10 to 12 feet deep; side entrance covered with split logs "over which they place a layer of mud collected from the river," 40 to 50 feet in circumference). Curtis (1907–1930, vol. 4, p. 7) mentions a small underground room with a flat roof that women used for a work (and seclusion?) room and old men who had no blankets slept in during cold weather. This is for the


N. Thompson
Thompson R.
Fraser R.
Okanogan R.
Columbia R.
Skagit
Methow R.
Chelan
Clark Fork
Spokane R.
Wenatchee
Chehalis
Naches
Yakima R.
Palouse
Clearwater
Cowlitz R.
Snake R.
Columbia
Umatilla
Grande Ronde
Salmon R.
Willamette R.
John Day
Deschutes R.
Weiser
Payette
Snake R.
■ VILLAGES CLOSE TO WATER, LACK OF VILLAGE PLAN
○ SUPERFICIALLY CIRCULAR PITS, FEW INCHES TO SEVERAL FEET DEEP
Λ SUPERSTRUCTURAL FRAMEWORK REMAINS LACKING
≡ MULTIPLE POORLY DEFINED FLOOR LEVELS
Π ENTRANCES NOT FOUND (WHEN EXCAVATED)

MAP 19.—Distribution of various architectural traits (*continued*).

Yakima. Among the Nez Percé the same flat-roofed subterranean lodge was found (Curtis, 1907–1930, vol. 8, p. 42) as well as the men's sweathouse built on the same pattern as Spinden describes it. Cline et al. (1938, p. 40) report the deep pithouse for the Methow and Southern Okanogan as rare. It was probably very rare but the flat-roofed type among those tribes seems rather certain.

Unfortunately the excavations on the Upper Columbia (Collier et al., 1942, p. 37) failed to find or dig pithouse sites in their area. My frank opinion is that they, expecting to find the true, deep, raftered pithouse (which Ray, 1932, p. 31, records as rare in the area) did not carry their work, in the depressions that they tested, as far as they should have done. Too, they were driven from a promising site (23) by the waters rising behind Grand Coulee Dam. The 1950 fieldwork of River Basin Surveys in Chief Joseph Reservoir, immediately below the Grand Coulee Dam and thus immediately below the general region of the Upper Columbia diggings, spent a large part of the summer in house pits. The processing of the meager material and data gathered has been completed and has been printed (Osborne et al., 1952). From it the statement can be made that no deep, northern (Shuswap) type pithouse was found or excavated. Certainly nothing markedly different from the McNary forms was reported. The same is true of work done in the Moses Lake area in central Washington. In Equalizing Reservoir, to the north of Moses Lake and south of Grand Coulee, a salvage expedition from the University of Washington, dodging flying rocks from blasting, attempted to gather some data on a village that stood in the way of a new highway. Here one house pit, which fortunately had burned, had once had a fairly heavy and permanent-appearing superstructure. This information has not been placed in usable form and can be drawn upon only through heresay. I have no knowledge of the form of the roof.

That there is a difference archeologically and superficially between the true pithouse and slightly subsurface structures is obvious from Smith's (1906, p. 288) statement that (on sites in the northern Plateau) one could distinguish the circular hole of the pithouses from the saucer-shaped depressions of the summer houses.

Strong et al. (1930, p. 30) have described a site (18) on Miller's Island which shows similarities in size, position, and lack of settlement plan to 45–BN–53. It was probably a Tenino site. Like most early excavations the work in The Dalles-Deschutes area posed more problems than it solved. For instance, at none of the sites so far excavated in the Middle Columbia have we found the peculiar under-the-wall hearths (Strong et al., 1930, pp. 31–32). It is indeed difficult to reconcile these with what is generally known of pithouses and mathouses, yet the authors of the report state that "this was obviously the fireplace" (Pit C (Strong et al., 1930, p. 32)). They suggest a flue (Strong et al., 1930, p. 33), an architectural detail which I believe is unknown from the area. A flue, at any rate, should have been noted in the digging. Schumacher found a side fireplace and a draft or smoke flue in some of the small plank houses on the Rogue River, Oreg. (Schumacher, 1877, p. 29, pl. 4). This village was inhabited as late as 1856 and I would require precontact discoveries of a similar type before accepting the Rogue River heating system as aboriginal. We encountered a near-the-wall fire area at −11.0 DD in pit 42 (map 6) of 45–BN–53 and found charcoal ouside of the wall of the same pit at −8.5 DD. It is now felt that both of these were accumulations of fire debris or not regularly used cooking fires, probably the former.

While the Miller's Island site (18) is certainly more like the McNary sites superficially than is Wakemap Mound (Strong et al., 1930, p. 33 seq.), the multiple floor levels and other indications that house pits had been reused and redug many times were in even better expression at the mound than at 45–BN–53. The Wakemap pits, too, were also more conservative in the central location of their fire pits. Yet these same pits gave more evidence of having been the subterranean parts of true, deep pithouses with a sturdy, permanent superstructure than any others, that I am cognizant of, which have been excavated in the Plateau. There is some doubt, however; the fact that deeply excavated houses could not have been built in the early stages of the mound, for the simple reason that not enough depth of soil existed between surface and bedrock, is one of the best arguments of which I am aware for the great age of the less permanent dwelling types (very possible mathouses) as regular habitations in the Plateau. Furthermore, it seems improbable that better evidences of deep pits should not have shown on the Wakemap profiles. Truly, this site must be excavated further. It still does not come up to the expectations of what a true pithouse site should be like.

Krieger, excavating in the Vantage to Wahluke area of the Middle Columbia (Krieger, 1928 b, p. 17), found no structural remains, as "practically all of the original framework had rotted away." He explains this as due to the continual wetting of the site by the waters of the river. It is to be doubted that this explanation would serve at 45–BN–53. The soil is porous. Furthermore, it would need be shown that dampness would rot or cause the complete removal of the kind of wood concerned. And if all buried structural units had decayed at 45–BN–53, casts or postholes would have remained and been found and would have been completely sufficient for some purposes of archeological reconstruction. The same should have been true at Wahluke. The inclination is to believe that Krieger's area lacked true house pits (if McNary did). This should be settled when excavations have been conducted there. The Astoria report (Irving, 1850, p. 208) speaks of lodges excavated in the ground and lined with mats "where the women stayed." This was among the Walla Walla or Umatilla. These data were gathered in 1811 and probably refer to the flat-roofed pithouse seen later by Kane among the Walla Walla and already mentioned. Perhaps menstrual houses were built along pithouse lines there. It would seem logical that they might be conservative in their architecture.

Smith (1910, pp. 51–55) measured several house pits in the Yakima Valley. He excavated none, but the size and general description sound similar to those at 45–BN–53, with the exception that Smith's pits were in stony earth. The same investigator did not adequately work (or report) any of the numerous house pits which he records in the Thompson-Fraser drainage. There he mentions deep house pits with fire areas in the center. He also noted subterranean food caches, a detail seen at Wakemap (Strong et al., 1930, p. 35, fig. 8) but not so far recorded elsewhere to my knowledge. They are mentioned historically.

For numerous reasons it is particularly important that digging be done in Nez Percé territory. This group was apparently the van of an eastward movement and may well have always been a leader in Sahaptin movement. Pits of the classic subterranean type may have been in use among them more recently than elsewhere and, if so, traces should remain in their country, away from the damaging floods of the Columbia. Lewis and Clark's description of the pit near Kamiah, Idaho (Thwaites, 1904–5, vol. 4, p. 280; vol. 7, p. 33), an archeological site when the explorers were there, is most tantalizing.

The apparent absence of true house pits at first led to the conjecture that there was an absence of winter houses along the big river. The possibility that the tribes may have wintered farther back in the hills has been kept in mind during the examination of the early records. No evidence that there was any movement in the first severe months of the year, or in autumn, away from the large streams (except for the Okanogan) has been found. Smith (1910, p. 11) and Spinden came to the same conclusion. It can safely be accepted as a fact that the pits which we see along the Columbia and other rivers are to a large extent the remains of winter houses.

The conclusion that wood superstructural units or frames, which were removable and thus temporary, covered the 45–BN–53 pithouses is inescapable. Lewis and Clark (Coues, 1893, vol. 2, pp. 630–633; Thwaites, 1904–5, vol. 3, pp. 108–109, 115, 117) describe the stacks of house timbers carefully racked up against the coming winter and fall building season. They were noted along the Snake and Columbia Rivers and often sorely tried the souls of the firewoodless party. Most of the timbers noted by the Lewis and Clark party were split. Probably these were specially prepared structural units, and, of course, splitting a log will cause at least two house timbers to exist where only one was before. This is important in an area where there is no forest cover. There is no reason to suppose that the lumber was planks for houses of the Lower Columbia or Coastal type. It is very likely that, because of the scarcity of wood (Thwaites, 1904–5, vol. 3, p. 104), winter house timbers may have been used to construct shades and fish-drying racks in the summer. In volume 12 of the Pacific Railroad Reports (1860, vol. 12, pl. LX) appear what are probably racked-up timbers. This is apparently in Palus country. Curtis (1907–30, vol. 8, pl. opp. p. 174) illustrates clearly what is apparently the same method, and must have been a widespread areal trait, among the Wishram. Too, poles were often weighted down with large stones to keep them safe. This lack of timber might be of itself enough to explain the absence of the heavily raftered true northern type pithouse along parts of the Columbia. The flat-roofed variety, which would take fewer and less exceptional timbers appears to have been present in limited numbers. It has been mentioned for Umatilla or Walla Walla (Palus ?), Nez Percé, and Yakima. It is admitted that 45–BN–53 was only sampled, yet the pithouse, had it been present, should have been found; if not there, then at one of the four other sites so far excavated at McNary or the four or five dug in Chief Joseph. Members of the United States Exploring Expedition (Wilkes, 1845, vol. 4, p. 431) describe what may have been the true pithouse with side entrance on the west bank of the Columbia a few miles up from the Entiat (Entiyaticoom) River. This is within the Methow-Southern Okanogan range and, as previously stated, most authors agree that the true pithouse was rare but present there. It was rare enough in the 1840's so that it received special mention. Evidence from Wakemap Mound, given above, indicates, as Strong and his coauthors pointed out, that pithouses could not have been the original structures in the large midden mound, because of the lack of soil depth in the early stages. All of the early explorers and later writers, with the few exceptions given, mention only the type of site with which present workers are familiar (see Stevens, 1855, p. 232). All in all, neither the digging nor most of the early records indicate the presence of anything but an attenuated form of pithouse in the area at any time. Consequently the mathouse never actually had to replace the pithouse in the Plateau. It is probably, at least in a circular ground plan, most ancient. Of interest in this context is Barnett's (1944, p. 267) conclusion that the true side entrance pithouse which had existed among the British Columbia Coast Salish was abandoned in the early 1800's.

My present impression is that the Plateau was originally occupied by groups similar, at least on the economy level, in culture to the Great Basin (the plateau is, in many ways, little more than an extension of the Great Basin). This is not original; Cressman in 1942 (Introduction) and Krieger before that have supported or scouted the same theory. Imported culture traits, stimuli, or actual migrations from, most likely, north and west have linked Coastal and Plateau material cultures. These, and their directional shifts, changed Plateau culture from a generalized dry country fishing, gathering, and hunting one to the rather intermediate position which it occupied in pre-Plains and white influence years between a specialized fishing and gathering complex like the Northwest Coast and the type which the Paiute or some Shoshoni lived under in southern Idaho—Salmon and Snake River fishing regions of the Great Basin. Such a hypothesis would explain, fairly well, the many cultural facies of the Plateau that are most expressive of the Northwest Coast (woodworking, fishing, some tool types) and at the same time not leave unaccounted for the many more features which are not (lack of social stratification, hunting complex).

Harlan I. Smith has stressed an early movement of peoples and culture from the northern interior of the Plateau to the coast. As far as I am able to follow his data, they seem to bear him out. There are unfortunate gaps which need to be filled (architectural details for one) and the whole needs to be supplemented by further extensive digging on the coast and in the interior. He thinks that the physical type, points, geometric designs, and pipes came early to the coast. This influenced the coast in some degree but good stone chipping, the use of arrowshaft smoothers (grooved), chipped knives, drills, teeth dice, and extensive mortuary furnishings never became Coastal traits. They are all strong in the interior (Smith, 1903, p. 190; 1906, p. 292). Net sinkers are also rare (except at the mouth of the Columbia) but used on the coast, and they lose in importance and numbers as one moves up the Columbia and to the north. This is especially true for the notched variety. It is no doubt a function of the decreasing importance of nets and of increasing use of weirs and traps. This question of movement is vital and we shall return to it later.[5]

If the Plateau can be truly said to partake of features of both north and coast on one side and of Great Basin on the other, perhaps its most outstanding gross trait in this respect is the architectural. Halfway between the two extremes of northern pithouse and Basin wickiup would lie the Plateau living structures, the several-formed typical mathouses. This intermediate position of the houses was important in the formulation of the above hypothesis as to the intermediate position of original Plateau culture and its yielding to outside influences in some respects and retention of its midplace in others. It can be pointed out, here, that in the south, in the Basin, the wickiup (sometimes with a slightly subsurface floor level); in the Central Plateau the often partly subterranean and well-constructed mathouse; and in the northern part of the Plateau and out of it to west and north, the classic pithouse, form a rather interesting sequence of types. The increase to the north is not so much one of size but one of permanence and depth of excavation. The Columbia Plateau is intermediate. It is, too, intermediate in its settled (or lack of settled) character. Movement is less than in the Basin proper; food is more plentiful. But, in both of these important factors, the Coast and the near-Coast surpass the Plateau. It is not necessary to move as much to adequately feed the group. Of course, more permanent housing can result from such a situation and, at least in the north, pithouses appear to be one of its concomitants. Whether the Plateau-type house, as Ray properly calls it (1942, p. 174), is an outgrowth of the coastal mathouse, often a summer or camping structure, a local development, or a cousin of the coast structure cannot well be discussed now. A hint is given in this direction by the double pits sometimes noted on sites. Only two of these, pits 52 and 49 (map 5) and a pair from site 45–BN–6, have been excavated. In neither pit of either of these two pairs did we find evidence of the backthrown dirt in the other pit. It is possible, therefore, that they were in use during the same season. There is here a possible basis for the development of an elongate mathouse—one that might have obtained in early days as well as in the later sites. Ray (1939, p. 140) scouts this as a method of growth of the long form. Until we encounter a site or few burned structures and thus obtain some superterrene evidence nothing further can be added. Spinden (1908, fig. 2, p. 180) shows the same double-pit arrangement at one of his Nez Percé sites.

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[5] Since this was written, a paper offering further suggestions along this line has appeared (Osborne et al., 1956).

It seems that Cressman (1948, p. 85) has shown that the ethnographic Klamath pithouse, a permanent structure, did not exist in earlier times, at least on the sites that he excavated. The somewhat subsurface houses that he did find were in many details the same as those described for McNary. The only conclusion that follows from the evidence is that the true pithouse was in some places actively replacing the less permanent one. This might in some regions have been secondary activity. It is relatively certain that the permanent form could not have ever become important over the whole Plateau. The increasing horse culture would have seen to that. For similar, though not as strong reasons, it is to be doubted that any permanent structure would have ever fitted Plateau life in the large. The transhumanic existence, the lack of wood, the friable nature of much of the flood plain soil (it will not support deep pit walls for any length of time) and the excellence, for local purposes, of the mathouses all contribute to this feeling.

Well-made pithouses are of high antiquity in the Southwest and, presumably, in parts of California near the Klamath. If, on the other hand, there were a recent spreading of the use of permanent pithouses to the western Sahaptins (Klickitat, Kittitas) from the west and to the Okanogan-Methow from the north we have, in this activity, a recent advance of coastal and northern traits that is part and parcel of the next to the last long period in Plateau history. We think that we caught it in the burial discussion and apparently it is here—a movement of culture from, very largely, northern and western sources into and through our area. This northern and western influencing of the Plateau soon had to yield, probably long before it had run its course, to a more powerful cultural impetus from the east—Plains and white.

Although the foregoing discussion is neither lengthy nor particularly involved, it might be well to draw together a few of the more salient points, of speculation especially. A speculative or theoretical structure attempts to picture situations as they appear to have been from the evidence at hand. If the next seasons' diggings uncover information not consonant with the particular structure then it must come crashing down, to be rebuilt in a manner fitting with the latest principles. The value of speculative attempts lies in the fact that they do give a point of departure for both thinking and doing (i. e., excavation planning) and in this way test their own use and validity.

As illustrative material in a direct historical attack upon the problems of an area, distributional maps are of value. In thus working from the known to the unknown, from digging and literature toward some coherent picture of the architectonics of the Plateau, 11 traits have been isolated for mapping. Many are essentially negative details rather than positive statements of building usages at the sites excavated. They thus reflect the lack, often, of a true northern pithouse. Thus use of negative traits is unfortunate but the evidence, as given in part 1, admits of no other approach. The 11 traits have been placed on two maps as a simple measure to avoid congestion. There is no significance in their grouping (maps 18 and 19).

The lack of house-pit excavation even in regions where large numbers of graves have been opened vitiates such a distribution and leaves one area, the north, poorly documented. In general, if this fact is kept in mind, the maps illustrate a strong continuity in the building code throughout the area. Superficial details, like circular pits, are widespread, but more esoteric ones such as the finding of grinding slabs or mortar bases in house pits can naturally appear only in areas where a number of pits have been excavated.

SUMMARY

A few of the more salient points that were made and conclusions that were drawn appear below.

The burial site, 45–BN–3, was inhabited during the middle and late 1700's, and possibly into the early part of the next century. The house-pit site, 45–BN–53, was definitely earlier, at least such pits as were examined were all prehistoric; possibly it dates from the early 18th century. Unfortunately the single and brief occupation of 45–BN–3 and the lack of structures does not permit us the use of 45–BN–3 as a key site, although it is the best one excavated so far.

In the burial discussion it was suggested that some of the various methods described might hang together, fairly well, as a complex. The cists of 45–BN–3 type, it was pointed out, might be simply bases of the high, conical stacks of driftwood such as were seen by Townsend (1905, vol. 1, p. 282) in the early 19th century (presuming that both were of the same size). There is evidence that the tops of cists were burned off at 45–BN–3, in the Upper Columbia, and on the Thompson River. Were the conical stacks fired, the archeological appearance would be as we have seen the cists at 45–BN–3, were the ends deeply planted. Townsend describes these cones of poles fairly well for some extensive graveyards that he saw near the Columbia below Walla Walla. There was nothing inside of the cones (i. e., the body was buried beneath them) and there was no evidence of cremation around. It seems possible that an influence of cremation might have led to the burning off of the stacks. Perhaps part of a cremation—mourning ceremony was grafted onto inhumation. It is indeed strange that ethnographers have no absolute data on this late form of disposal of the dead. It is logical to assume that the numerous sticks over many later and almost modern graves illustrate a terminal phase of the use of the old conical protective cist or cone.

As to the burials themselves: orientation was westerly or downstream, some stage of flexure was usual, grave goods of both white and native manufacture appeared in about equal quantities and deposition was on the back or side. Evidence so far uncovered leads to a conclusion that some burial traits, particularly those of shed and canoe burial, spread up the Columbia from, probably, Chinook centers. Other methods of disposal of the dead may be northern in origin: cremation and the plank cist, and possibly the conical stack of sticks. So far, none of the evidence points toward a movement of populations but rather toward cultural spread. Therefore it is necessary to state, here, that as far as is known the Sahaptins are ancient residents of the Columbia main stem. Stratigraphy does exist in the cemeteries of the Middle Columbia. There can be no doubt that the earliest burials so far recovered were flexed inhumations with a westerly orientation (later work (1950) indicates that this was preceded by extended inhumations)—after and above these were cremations or mausoleum burnings (45–BN–55) followed by the plank cists of 45–BN–3. The "Plains overlay" was not the first to affect the receptive and nonaggressive Plateau cultures. There was an ancient and powerful one from the north (Salish?) and a partial one from the west, at least so far as the Sahaptins were concerned, before the influences from the east met and overpowered the upriver advances of western traits. Indeed, the influences from the west were mitigated and all but erased to such an extent that one of the most easily discerned breaks in cultural continuity is that between the Middle and Lower Columbia, or Sahaptin and Chinook realms.

How much of this was cultural and how much was actual physical penetration of populations we cannot say until osteological studies have been made. The extensive changes reported to have taken place in Salish and Sahaptin territories during some decades before and after white contact are discussed by Teit in 1928 and reviewed by Spier and Sapir in 1930 and by Berreman in 1937. In 1938 Ray edited and contributed to a series of short papers which effectively disposed of some of the major aspects of postulated recent movements in the area. I am not sure, however, that he and his collaborators have not gone too far in their statements that the ranges of the Salish and Sahaptin are or have been generally immutable. Perhaps the archeology will have something to say before too long on that score. Right now, it appears that the Sahaptins may have had a greater range at one time, both culturally and demographically, and have been compressed by the Salish from the north. This, I hasten to point out, need not mean war. The taking over of culture and language, an advancing downriver front of marriage, language, and other phases of culture is all that is needed. Because they are gradual and irregular, such changes are difficult to trace, especially archeologically. Jacobs (1937) has described a process for smaller groups along the coast and, right now, the many leanings of southern Plateau culture on the north incline me to believe that this was going on in the Plateau for centuries. It is difficult to see the Sahaptins pushing far downstream against the Chinook and this group would probably have sent more in the way of stimuli and traits upstream than it accepted (see burial types). Strangely, the most powerful Sahaptin group of all, the Nez Percé, was leaving the River and moving out of the Plateau orbit. Perhaps this conclusion is overforced by their early acceptance of Plains traits but it does seem strange that, in spite of the fact that they had an excellent range, this powerful tribe did not show more interest in the Columbia. They had, of course, much of the Snake in their country. Their culture is, as well as one can tell from the small amount of work done, only slightly at variance with the Sahaptin-Interior Salish norm. Its few variances indicate a more conservative tendency. It appears now that this large, possibly conservative (as far as material culture goes) group was finding it, because they were not as specialized as some of their river-dwelling relatives, easy to change the emphasis of their culture to the east and buffalo. These animals ranged, not rarely, close or into Nez Percé territory and would thus have provided an appropriate lure. The Blackfeet and, to a lesser extent, the Shoshoni, provided a rebuff which kept the tribe from moving east from its homeland. The later thrust of Plains traits, racing through Nez Percé and Yakima country, probably did aid at least the latter tribe to expand culturally as well as physically at the expense of the Salish along the Columbia. This is, as before intimated, a question for further examination.

The present interpretation of the pithouse question has been sufficiently discussed. Krieger (1928 b, p. 8) stated that some of the evidence from Wahluke would appear to indicate close connection of material culture and "tribal practices" in the whole Plateau and Shoshonean areas. He must, in the latter, have meant the fishing Shoshoni of the Salmon and Snake Rivers (which have been previously mentioned) and not the great Shoshoni groups to the east and southeast. His observations, at any rate, are definitely in line with some of the theories set forth herein as to the continuity that appears to have existed between Plateau and Basin cultural facies. I look upon the use of the spall knife, usually a large quartzite flake, in both northern Basin and Plateau as a link. Further study of its distribution and typology is necessary. From a cultural point of view we have postulated and given evidence for the penetration of changes in methods of disposal of the dead, of (more speculative) a tendency to use a true pithouse in some areas, and of a few artifacts and trade items (mallet pestles, celts, some marine shells) from both north and west. More certain, of course, is the later arrival of Plains influence from the east.

Other than this, plus The Dalles region-Sahaptin material cultural break, a remarkable flatness in tool forms and art types, so far as analyzed, appears to exist throughout the Plateau. True, areas of difference exist. The Upper Columbia-Grand Coulee region is one of cultural poverty and the Nez Percé section will probably yield surprises, but the above section is not inaccurate. The collections made and studied so far are not sensitive enough to do more than hint at changes or variations of material culture congeries in the whole intermontane area.

One of the most intriguing of artifact types, and one previously unreported from the area, are the carved slate objects, possibly effigies (?) or fetishes. These may well be part of a widely spread complex. Such an examination of chipped stone, primarily projectile points and knives, as was possible indicates that there was a general adherence to what might be called a large complex or pattern (or perhaps two of these) and that there were regional or areal shifts in emphasis among the various tool forms as cultural emphases differed within the Columbia Basin as a whole. There is a decided change in materials used from the south (cryptocrystalline) to the north (basalt and argillite). Stemless points are preferred in the north and there is an increase in the use of stems and basal or side notches into the downriver section. There is some indication that a relationship may exist, or that a similarity may appear between northern Basin and southern Plateau chipped points. Bone work has, so far, not been outstanding in the McNary region.

The most important results of archeology have been those leading to or bolstering a reassessment of the question of pithouses in the Plateau area. The true northern pithouse, with permanent roof structure, was rare. The flat-roofed type and pithouses in The Dalles area are almost the only deep houses in the region. An impermanent superstructure, a shallow pit slightly elongated east and west, and lack of evidence of an entrance way are characteristics of all house pits excavated so far. These, it is believed, indicate that mathouses were the only ones in use during the period which our archeology has penetrated. This is, admittedly, historic or just prehistoric—perhaps not over 2½ centuries. There is no reason to believe that other (deeper) types of pithouses may have existed at the site studied unless their age was enough greater so that their surface manifestations were altered to complete conformity with the types found. It is suggested that the lack of suitable timbers may have impeded the development of the sturdy Shuswap-type pit dwelling at least in the Middle Columbia.

Studies of the trade goods found at 45–BN–3 will provide a point of departure for further work. The buttons found have been rather well dated and should provide a basis for dating other sites of the same type.

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APPENDIX 1

INDIAN SKELETAL MATERIAL FROM THE BERRIAN'S ISLAND CISTS (45–BN–3), LOWER McNARY RESERVOIR, WASHINGTON[1]

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INTRODUCTION

Sometime during the second half of the 18th century, perhaps just before Lewis and Clark went down the Columbia in 1805, a group of Indians were burying their dead on the lower end of what is now Berrian's Island, on the Washington side of the river. The bodies were placed in plank cists, typical of recent Plateau culture, and with them were placed various native-made articles and White trade goods. In 1948 a River Basin Surveys crew, under the direction of Dr. Douglas Osborne, carefully excavated 50 of these plank cists. Osborne's report fully describes the excavations and their findings, and analyzes the cultural materials. As an addition to his report, physical descriptions of the skeletons themselves are recorded here.

Both the cultural and racial interpretations have been plagued by a meagerness of comparative material. For the physical anthropology only a few reports on skeletal material from Washington and Oregon have been published.[2] Because of this, and also because the Berrian's Island series is small and some cranial deformation is present, I am unable to state except in the most general terms, who, racially speaking, these Indians were. From his standpoint, Dr. Osborne is unable to make a positive cultural and tribal identification. He is convinced that a single burial complex is represented (p. 143). From the presence of Colonial uniform buttons made as early as 1750 (pp. 107, 225), and the absence of firearms, which were used above the Umatilla by 1811, the plank cists can be dated somewhere between a decade or so after 1750 and before 1810 (pp. 107, 193). Although Berrian's Island is within the territory historically occupied by the Eastern Umatilla (see p. 123), Osborne is reluctant to identify the burial cists with them or any other Middle Columbia tribe. So, while it seems safe to ascribe the Berrian's Island plank cists to one of the Sahaptin-speaking tribes, it is not clear from the present evidence whether they were made by the Umatilla, Walula, Cayuse, or Yakima. More excavations, more artifacts, and more skeletal material are necessary before positive cultural and racial identifications can be made.

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[1] Submitted April 1951.

[2] Hrdlička (1927, pp. 86–90), 8 male and 7 female "Sahaptin and Salish" skulls; Stewart (1950), 1 male skull from the John Day region, Oregon; Cressman (1942, pp. 141–143).

Barring any positive racial identification of the Berrian's Island skeletons are several questions, to which satisfactory answers cannot now be given. Briefly, these questions are: (1) Does the variability of the Berrian's Island series give any clues as to its racial composition? (2) Does the series fit in closely enough with other nearby series to suggest late occupancy by one racial group? (3) If so, what is the geographic extent of this group, and how deep are its roots in the area? Answers to these and other questions will come only when enough archeological documented skeletal material from Washington and Oregon has been carefully studied. The value of the present report, then, is that it provides new data pertaining to a single closely dated sample from a little-known area. With future comparisons in mind, I have endeavored to objectify what to me are the most striking morphological features of the Berrian's Island series (see Material and Methods).

In addition to the racial aspects of the skeletal material, there are several features of cultural significance which are recorded in bone. These are cranial deformation, dental conditions, and bone pathology. In addition to describing these features, I have tried to inject some life into my interpretations of them.

MATERIAL AND METHODS

The skeletal remains from the 50 burials described by Osborne (pp. 28–45) form the basis of this report. Since the burials numbered 1 to 16 in the field had been badly disarranged and scattered by a washout, I endeavored to sort back all bones to their original skeletons. In so doing, I relied largely upon matching rights and lefts, and fitting articular surfaces together. Failing these, I occasionally had to fall back on stage of epiphyseal union, gross size, and bone texture. While the sorting was done with great care, I cannot be absolutely certain of exactness in all instances. As a result of the sorting, parts of 7 or more individuals that did not belong with any of the 16 burials were left over. In this report, therefore, we are dealing with parts—usually full skeletons—of 57 individuals. Table 1 gives their distribution by sex and age. These data for the individual burials are incorporated in Osborne's list (pp. 28–45).

Sex and age determinations were made from the entire skeleton, if present. In determining sex, I benefited from the assessments of Robert Hanna, who examined the Berrian's Island pelves. At the

Table 1.—*Distribution of Berrian's Island skeletons by sex and age*

Age	Male	Female	Total	Percent
Infant (up to 3 years)			8	14.0
Child (4–6 years)			4	7.0
Child (7–12 years)			4	7.0
Adolescent (13–17 years)			2	3.5
Subadult (18–20 years)			2	3.5
Young adult (21–35 years)	2	9	11	19.3
Middle-aged adult (36–55 years)	7	5	12	21.0
Old adult (56–75 years)	3	2	5	8.8
Other adult	2	7	9	15.8
Total	14	23	57	99.9

time, Mr. Hanna had just concluded a study applying the ischium-pubis index (Washburn, 1948)[3] and several other criteria to the determination of sex in Eskimo and Indian pelves.

Wherever possible, the most striking morphological features of the Berrian's Island skulls are expressed metrically by use of a coordinate caliper. In this way, I hope to avoid the subjectivity of the usual morphological rating scales of "small," "medium," and "large." At the same time the standard cranial and long bone measurements have been included.

For the most part, the measuring techniques used in this report have been previously described (Newman, 1947, apps. A and B). A change was made in the midline landmark for the subtense to zygomaxillare (inferior maxillary) breadth. Formerly I placed the coordinate arm of the caliper "at the junction of the lateral and inferior walls of the nasal aperture" (Newman, 1947, p. 40), but indicated this was an unsatisfactory landmark. For the present study I found a better midline landmark to be on the intermaxillary suture just below the root of the nasal spine. With the two points of the caliper on the most anterior-inferior points on the zygomaxillary sutures of either side, and the coordinate arm on the midline of the maxilla, a quite accurate measure of the forward jut of the malars is achieved. This is the Index of Facial Flatness (lower) in table 2.

Unless otherwise noted, the long bone lengths are maxima. Tibial length excludes the spine.

Tables 2 and 3 list the ranges and means for the cranial and long bone measurements and indices. No further statistics are presented in this report because the series is small, and the very moderate amount of cranial deformation is still sufficient to influence some of the vault dimensions. In calculating the means for these dimensions, therefore, only those skulls with slight deformation or less are used. Even so, these mean dimensions can only be considered approximations of wholly undeformed means.

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[3] See Literature Cited, p. 224.

TABLE 2.—*Measurements and indices of the Berrian's Island skulls*

Measurement of index	Males			Females		
	Number	Range	Mean	Number	Range	Mean
Glabello-occipital length [1]	5	171–193	179.20	2	158–166	166.00
Maximum breadth [1]	5	131–155	144.40	2	143–145	144.00
Basion-bregma height [1]	3	134–143	137.67	2	130-134	132.00
Cranial module	8	148.7–161.3	153.62	6	145.0–149.3	147.28
Basion-porion height	7	20–24	21.28	7	10–22	16.88
Length-breadth index [1]	5	74.9–84.8	80.63	2	87.4–90.5	85.24
Mean height index [1]	3	80.0–93.5	86.22	2	82.8–87.7	85.24
Minimum frontal breadth	10	90–105	94.70	6	91–94	92.33
Nasion-bregma length	9	105–117	113.33	6	105–115	110.00
Subtense to nasion-bregma length	9	14–24	20.51	6	18–23	20.18
Frontal curvature index	9	16.2–21.0	18.29	6	13.3–20.0	18.18
Total facial height	9	121–136	127.56	5	105–115	117.20
Upper facial height	10	73–80	76.70	7	65–72	70.71
Bizygomatic breadth	7	138–155	146.00	4	133–141	136.75
Mid-facial breadth	8	93–108	100.38	7	91–102	95.86
Total facial index	7	78.1–95.6	87.12	2	87.4–90.2	88.82
Upper facial index	7	48.0–55.9	51.95	4	47-5–55.6	52.16
Mid-facial index	8	71.3–82.7	76.81	7	67.0–81.3	73.92
Malar height	11	20–35	25.32	8	17–22	20.16
Internal orbital breadth	9	94–106	100.89	7	93–100	98.00
Subtense to internal orbital breadth	9	17–30	19.93	7	11–22	18.46
Inferior maxillary breadth	8	93–106	100.00	7	88–96	93.71
Subtense to inferior maxillary breadth	8	24–28	26.04	7	15–25	21.73
Facial flatness index (upper)	9	17.3–21.6	19.76	7	11.9–22.9	19.05
Facial flatness index (lower)	8	24.2–29.2	26.06	7	16.0–31.8	23.92
Zygofrontal index	7	59.9–68.8	65.60	4	65.9–70.7	67.68
Nasal height	11	52–59	54.21	7	48–53	50.61
Nasal breadth	10	22–29	24.51	7	21–24	22.88
Nasal root breadth	10	19–24	20.88	7	16–23	18.87
Nasal root height	10	10–16	12.34	7	9–14	11.27
Nasal bridge breadth	8	13–17	15.49	3	14–16	15.20
Nasal bridge height	7	8–13	10.26	2	7–8	7.65
Nasal index	10	39.3–50.7	45.07	7	40.4–47.9	45.26
Nasal root index	10	45.2–72.8	59.53	7	40.9–70.0	60.51
Nasal bridge index	7	57.6–81.5	67.93	2	45.6–50.0	47.81
Left orbital height	11	35–40	36.55	7	35–38	36.48
Left orbital breadth (mf)	11	41–47	43.76	7	41–45	42.90
Left orbital index	11	75.6–92.7	83.66	7	82.4–88.4	85.07
External palatal length	9	50–64	55.13	9	49–54	50.91
External palatal breadth	8	61–76	67.75	10	56–67	62.80
Bigonial breadth	7	109–118	111.86	10	92–110	99.90
Symphysis height	10	32–44	38.09	10	29–37	34.06
Min. breadth asc. ramus	9	34–42	36.86	11	25–35	31.81
Malar height/symphysis height	10	48.1–93.2	67.45	6	53.1–66.2	60.68
Ramus breadth/symphysis height	9	81.4–113.9	97.35	9	76.9–113.8	95.91

[1] Only skulls with slight deformation used

TABLE 3.—*Mean long bone lengths (cm.) of the Berrian's Island series*

Bone	Males				Females			
	Right		Left		Right		Left	
	Number	Mean	Number	Mean	Number	Mean	Number	Mean
Femur, bicondylar length	7	441.9	6	443.8	7	402.4	7	408.1
Femur, maximum length	7	444.3	6	446.3	8	410.4	7	414.7
Tibia, length	5	363.0	7	354.7	6	313.3	7	333.6
Humerus, length	8	318.8	4	316.8	5	290.6	4	282.2
Radius, length	6	250.3	4	252.5	6	222.0	3	220.0
Ulna, length	4	273.2	4	273.8	2	236.0	3	235.7

The scale of assessing tooth wear, as applied to the molar surfaces, is:

1st degree	slight enamel wear
2d degree	dentine visible
3d degree	all enamel worn off surface
4th degree	pulp cavities exposed

In cases where the degree of wear is not the same on all molars, e. g., where 1st molars are 3d degree, 2d molars 2d degree, and 3d molars 1st degree, an average assessment is made. In the instance cited, such an average would be 2d degree.

DESCRIPTION

RACIAL

Visually, the Berrian's Island skulls appear similar enough to represent a single racial type, except for No. 17 and No. 41 which look rather like California crania. Perhaps these two came from California, since the Columbia River people occasionally had north Californian slaves. (Ray, 1939, pp. 30–35. It must be stated that slaves in general were much less common above The Dalles.) Without pretending to make a definite type description from a numerically inadequate series, the most outstanding characteristics of the Berrian's Island skeletons are as follows:

Vault.—Although deformation has partially masked the original headform, the five slightly deformed male skulls have a barely brachycranic mean of 80.63 for the length-breadth index. If wholly undeformed, this mean would probably slip down into the mesocranic range. Again allowing for deformation, the few figures for vault height seem moderate. Anterior to the break in the frontal curvature, the forehead is consistently rather sloping, as indicated by the low frontal curvature index of 18.29 for nine males.

Face.—The consistently pronounced frontal and lateral projection of the malars is the single most striking feature of the Berrian's Island skulls of both sexes. The extent of the forward projection is shown by the low means for the two indices of facial flattening. A rough measure of the lateral projection is afforded by the low mean of 65.60 in the zygofrontal index for males. This figure is a function here of the wide, flaring malars rather than a narrow minimum frontal diameter.

A second striking feature, more noticeable in males than in females, is the considerable height of the mandibular symphysis. This deep-jawed condition is in striking contrast to the medium dimensions of the malars, as expressed by an index dividing malar height by symphysis height. Almost as striking is the contrast between the mandibular height at the symphysis and the moderate development of the ascending ramus. This relationship is expressed by the ramus breadth/symphysis height index.

Also noteworthy is the relatively narrow nasal aperture, indicated by the male and female means of 45 for the nasal index. Not only is the aperture narrow, but the nasalia are quite highly arched. This is expressed by the high means for the nasal root and nasal bridge indices. In profile, the nasalia of the males are about equally divided between the slightly concave or straight and the concavo-convex forms.

The total impression of the face is that it is wide, flat, but not massive except in the depth of the lower jaw. The nose is narrow, and usually has a prominent root and bridge.

Skeleton.—Mean long bone lengths are given in table 3. From all the maximum lengths, using Pearson's formulas (Pearson, 1898), mean stature estimates for 13 males and 11 females, are, respectively, 163.8 cm. and 150.5 cm.

DEFORMATION

Table 4 shows the variety and degree of artificial cranial deformation in the Berrian's Island skulls, assessed according to Neumann's types (Neumann, 1941). Occipital or lambdoid deformation is indicated by the presence of a flattened area of such extent and conformation that it could not be a natural formation. Where such flattening is assessed as slight, its area is small, no asymmetry of the occiput is present, and in all likelihood it was unintentionally produced. It is a matter of common observation that placing a newborn with the back of its head even on a fairly soft surface will, as a continued practice, produce a slight amount of occipital flattening.

TABLE 4.—*Form and degree of deformation in the Berrian's Island skulls*

	Male		Female		Total[1]	
	Number	Percent	Number	Percent	Number	Percent
Undeformed	--------	--------	--------	--------	--------	--------
Occipital:						
Tract	1	50.0	--------	8.3	1	32.0
Slight	3		1		[1]5	
Medium	1		--------		1	
Lambdoid: Slight	1		--------		1	
(Fronto-vertico-occipital?):						
(Medium?)	1	41.7	1	83.4	2	60.0
(Pronounced?)	--------		1		1	
Fronto?-vertico-occipital:						
Slight	1		1		2	
Medium	2		--------		2	
Pronounced	--------		1		1	
Fronto-vertico-occipital:						
Medium	--------		2		2	
Pronounced	1		4		5	
(Bifronto-occipital?)	--------		1	8.3	1	8.0
Bifronto-occipital: Medium	1	8.3	--------	--------	1	
Total	12	--------	12	--------	25	--------

[1] Including 1 skull of questionable sex.

The presence of frontal flattening is more difficult to determine, because in a number of cases there are slightly flattened planes on either side of the median frontal crest. Conceivably these planes could be the result of bifrontal pressure, but except for one or two cases (see table 4 and pl. 33, *upper*) I do not consider them clearly enough defined to merit such a classification. Rather, I am inclined to view them as nonartificial concomitants of a naturally sloping forehead with a well-developed median frontal crest. There are, however, a few skulls that show a definitely flattened mid-frontal area. One in particular (No. 10, see pl. 33, *lower*) has a depressed frontal so typical of Chinook skulls from the Lower Columbia. Interestingly enough, all the skulls noted in table 4 as having either questionable or definite frontal flattening also show a mounding up of bone just anterior to the coronal suture, especially around bregma, as well as a clearly marked post-coronal depression. In my opinion, the precoronal mounding and postcoronal depression should be considered as related responses to frontal flattening in artificially deformed skulls.

Table 4 demonstrates several points of interest, which will merit more extended discussion in the Comparative Analysis section. The first is the greater proportion of fronto-occipitally deformed skulls among the females. More than twice as many females as males show this intentional form of deformation. On the other hand, one-half of the male skulls show only simple occipital or lambdoid deformation, which from the point of view of child care, was clearly unintentional. Secondly, pronounced deformation is present in six female skulls, but in only one male. Clearly, intentional cradleboard flattening was largely a featured treatment for female infants on Berrian's Island.

Since in the Comparative Analysis section interest is attached to the early travelers' accounts of head flattening, I have tried to adopt what might have been their point of view in assessing the conspicuousness of the Berrian's Island deformation. In so doing, I have considered that the hair would mask all but the most extreme cases of occipital deformation. Accordingly, in the present series none of the skulls with simple occipital flattening would, when clothed with flesh and hair, appear deformed at all. In fact, my opinion is that only one skull in the entire series (pl. 33, No. 10) possesses sufficiently extreme frontal flattening to have made it definitely noticeable in the flesh. According to my scoring, 5 females and 1 male had enough deformation to *possibly* be noticeable. The remainder would, in my estimation, be judged as undeformed by early travelers. If I am correct in this, the people who buried in the Berrian's Island cists would probably have passed as undeformed to the early travelers.

BONE PATHOLOGY

Pathological changes other than in the teeth and glenoid fossae (see p. 215) are rare in the Berrian's Island skulls. The changes present are as follows:

Fracture and skewing of the nasalia: Nos. 1 and 10, both adult males (see pls. 33 and 34).

Lipping of the occipital condyles (arthritic?): Nos. 3 and 5, both old (56–75 yrs.) males.

Round pit 7 mm. in diameter on left supramastoid crest: No. 3, old male.

The skeletons of the Berrian's Island series evidence greater frequency and severity of pathological changes. These will be considered by the individual skeleton, and will be summarized later (p. 214).

No. 2, old male: (1) Heavy anteroposterior bowing of femora; (2) beginning lipping and formation of bony spicules presaging ankylosis of the sacroiliac articulation; (3) arthritic lipping of distal articular surfaces of right radius and ulna.

No. 3, old male: (1) Heavy lipping of peripheries of articular surfaces of the long bones, especially the distal humeri and radii; (2) arthritic lipping of the cervical vertebrae, and incomplete ankylosis of at least two of them. Lipping of lumbar vertebrae more moderate.

No. 7, old female: (1) "Veining" impressions on lateral surface of the right tibial shaft, with hyperemia on the medial surface; (2) ankylosis of two lower thoracic vertebrae; (3) lipping and exostoses of an arthritic nature of lumbar vertebrae.

No. 10, old male (see pl. 38):[4] If the pathological left femur showing either nonunion or amputation, the ankylosed right tarsals, and the ankylosed sacrum and left innominate actually belonged to the same individual (as they were so numbered in the field), the overall diagnosis provided me by Dr. William J. Tobin, a Washington orthopedist, is that of a metastatic osteomyelitis. As Dr. Tobin tentatively reconstructs the case, the patient suffered a fracture, possibly compound, of the upper third of the left femoral shaft. The fracture failed to unite, causing absorption of the ends of the broken shaft. An infection could have set in, and spread through the blood stream. This pyemic infection, finally, could have caused the lumbosacral fusion, the beginning left iliosacral ankylosis, and the complete subastragalar fusion of the right foot. The exostotic joint changes on the distal articular surface of the right femur, the similar and more drastically limiting changes on the proximal articular surface of the left tibia (field marked "Burial 12") and of what appears to be a fragment of the distal articular surface of the left femur (field marked "Burial 10") could have also resulted from the same infection.

This diagnosis of the upper third of the left femoral shaft as a case of nonunion and absorption following a possibly compound fracture does not completely rule out the possibility that it represents an amputation. To be sure, a fragment of what is apparently the lower end of the same femur (see above) would tend to rule out amputation. But this distal articular fragment has undergone such severe pathological changes that I cannot be absolutely certain that it *is* a left, or that it is *the* left that belongs to the same individual that suffered the nonunion.

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[4] The skeletal parts assigned to this individual came variously from burials 4, 7, 9, 10, 11, and 13, and were placed together by me on the basis of matching or, failing that, gross size and texture. This was made easier since No. 10 was the largest male in the series.

In any case, Dr. Tobin states that the gross appearance of the truncated part of the left femoral shaft indicates that the individual lived a long time after the fracture or amputation. The healing and anterior slope of the stump means that either the man walked on it as a stump or that the ununited distal end impinged upon it almost constantly.

In weighing the possibility of an amputation rather than nonunion, Ackerknecht's writings suggest that surgical amputation would be beyond the skill of people like the Columbia River Indians (Ackerknecht, 1957, p. 30).[5] Still, in view of the late date of the site, it is barely conceivable that some passing white did the amputation. Or it could have been a traumatic amputation.

Without being positive, I favor the interpretation of nonunion with subsequent metastatic osteomyelitis, rather than amputation. In this case, the rugged old man would have been an almost helpless cripple when he died. It seems likely that he would have been forced to shift his body around on his powerful legs. This is suggested by the extraordinarily heavy muscle attachments of the left arm bones (rights missing). The left leg, with its nonunion, would probably have been dragging loose, and the right leg largely immobilized in a flexed position. Furthermore the exostoses and lipping of the vertebrae suggest limited mobility of the spinal column.

No. 17, middle-aged male: Tremendous arthritic lipping and crushing of the bodies of the lumbar vertebrae. These changes extend up through the thoracic into the cervical vertebrae.

No. 20: Minor case of lipping of the vertebral bodies.

No. 23: Minor case of lipping of the vertebral bodies.

No. 35, middle-aged male: (1) Healed fracture of the articular surface of the distal end of the right radius; (2) arthritic lipping of the lumbar vertebrae.

No. 36; adult male (over 26 years): Symmetrical and curved "veining" on lateral surface of left tibial shaft.

No. 41, middle-aged male: (1) Healed diagonal fracture at proximal third of right tibia, with tremendous osteomyelitic enlargement of the shaft. A fragment of the proximal articular surface shows enough eroding and flattening to suggest that the tibiofemoral joint was immobilized at about 120°. The distal articular surface appears normal. So does the left tibia, except for a roughened and lipped distal articular surface, articulating with the talus. Subastragalar fusion is present in the tarsals; (2) the acetabulum of the right innominate is heavily eroded and lipped, with corresponding changes in the fovea of the right femoral head; (3) most of the vertebral bodies are roughened, flattened, and lipped.

In some respects this case parallels the more remarkable one of No. 10, and may represent another instance of metastatic osteomyelitis. No. 41 would also class as a cripple.

No. 42, young adult female: (1) Subastragalar fusion of both talocalcaneal articulations; (2) incomplete ankylosis of both sacroiliac articulations. The young woman must have been a partial cripple.

No. 44, middle-aged male: (1) Roughening and lipping of an arthritic nature involving all the articular surfaces of both knee joints; (2) slight arthritic lipping of lower lumbar vertebrae.

It is noteworthy that of the 10 cases of more severe skeletal pathology, 8 are males. This is partly a function of the greater average age of the male series (see table 1). In addition, the several instances of fractures may be a reflection of more hazardous male pursuits. Equally interesting is the age distribution of the 10 cases; all but one were middle-aged or old adults. The young adults in the Berrian's Island series are almost free from pathology.

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[5] Dr. Osborne points out that Ogden observed a Klamath who had an arm amputation (Eliot, 1910, p. 214). The Klamath stated that he had done the amputation himself—on himself.

This sample of 10 cases is patently insufficient to permit such generalization about the status of health. But the incidence of traumatic injuries is certainly low; no skull fractures are apparent. Arthritis makes its appearance in several vertebral columns, and probably caused the most general disability of advancing years. Osteomyelitic infections, with attendant ankyloses, are present in two cases. No evidence of syphilitic infections was found.

DENTAL PATHOLOGY

The most significant dental feature of the Berrian's Island series is the heavy amount of wear on the occlusal surfaces of the teeth. According to the scale defined on p. 209, 25 out of 29 adult skulls show wear of 3d degree (all enamel worn off surfaces) or more. Dental wear is not only a function of gritty food, but also of age. This is shown in table 5, where the degree of wear increases with age. In this relationship, no difference between the sexes is apparent.

Directly correlated with the amount of tooth wear in the Berrian's Island series is the incidence of caries, apical abscesses, and antemortem tooth loss. In fact, table 6 demonstrates that caries only appears with 3d-degree wear, and was the direct result of pulp exposure in all but one case. More than half of the carious teeth are first molars, the teeth that have been in situ longest and have therefore been exposed to a maximum of grinding wear.

The incidence of caries in the Berrian's Island series may be considered low, since 17 out of 30 individuals were wholly caries free, and only 4 to 5 percent of the teeth of the whole group show caries. The latter figure even includes the teeth lost ante mortem, on the assumption that they were lost through caries resulting from pulp

TABLE 5.—*Relation of age to tooth wear in Berrian's Island skulls*

Age group	Degree of wear			
	1st	2d	3d	4th
Child (7–12 years)	2			
Adolescent (13–16 years)		1		
Subadult (18–20 years)	1			
Young adult (21–35 years)	1	3	2	2
Middle-aged adult (36–55 years)			10	2
Old adult (56–75 years)			2	3
Adult (over 26 years)			2	1
Total	4	4	16	8

TABLE 6.—*Relation of dental caries to tooth wear* [1]

Number of carious teeth	Degree of wear				Total caries
	1st	2d	3d	4th	
0	2	4	9	2	17
1			1	1	2
2			1	1	2
3			3	2	5
4			1	1	2
5			1	1	2

[1] Including 1 adolescent and 1 subadult, but eliminating children.

exposure. This low incidence can be attributed in large part to the effacement by wear of the occlusal crevices affording purchase for carious infections. The secondary deposition of dentine afforded protection to the pulp cavity, except in the stated 4 to 5 percent of the teeth, where the wear was too rapid for the deposition to keep pace.

In almost all cases, apical abscesses have resulted from caries due to pulp exposure. As could be expected, over half of the apical abscesses involve first molars. Out of 30 individuals, 14 are abscess free. The following count shows the number of apical abscesses per individual:

No abscesses	14 individuals
1 abscess	2 individuals
3 abscesses	7 individuals
4 abscesses	4 individuals
5 abscesses	1 individual
8 abscesses	1 individual
10 abscesses	1 individual

Ante-mortem tooth loss occurs in the Berrian's Island series when caries, due to pulp exposure, resulted in sufficiently extensive apical abscesses to cause the tooth to drop out. No cases of ante mortem loss are seen in the 6 individuals with only 1st and 2d degree wear, but in 9 individuals with 3d and 4th degree wear, a total of 21 teeth was lost before death.

The effects of dental wear are not confined to the teeth. With the exception of one young adult female (No. 43), all the adult skulls show areas of erosion on the anterior surface of the glenoid fossa. That this erosion is a preadult phenomenon is attested by its presence in a child (No. 18), an adolescent (No. 21), and a subadult (No. 11). The erosion is obviously occasioned by forward pressure of the mandibular condyles. It is probable that the forward occlusal shift of the mandible, occasioned by tooth wear, caused extra pressure to be exerted by the mandibular condyles on the anterior aspect of the glenoid fossae.

It should now be apparent that the dental ills of the Berrian's Island people are directly related to tooth wear. The cause of this wear may be assumed to have been gritty food. On this point we have a description by Lewis and Clark of the Sokulks, a Sahaptin-speaking tribe[6] then located on the Columbia River just north of its juncture with the Snake. This description is particularly pertinent here, since it deals with people closely contemporaneous with the Berrian's Island group.

> Among the Sokulks, indeed among all the tribes whose chief subsistence is fish, we have observed that bad [worn?] teeth are very general; some have the teeth, particularly those of the upper jaw, worn down to the gums, and many of both sexes, even of middle age, have lost them entirely. This decay of the teeth is a circumstance very unusual among Indians, either of the mountains or the plains, and seems peculiar to the inhabitants of the Columbia. We cannot avoid regarding as one principal cause of it the manner in which they eat their food. The roots [camas] are swallowed as they are dug from the ground, frequently covered with a gritty sand; so little idea have they that this is offensive, that all the roots they offered us for sale are in the same condition. A second principal cause may be their great use of dried salmon, the bad effects of which are most probably increased by their mode of using it, which is simply to warm, and then swallow the rind, scales, and flesh without any preparation.[7]

From Lewis and Clark's description, it seems that while the wear was comparable to that seen at Berrian's Island, ante-mortem tooth loss, especially in the anterior teeth, must have been much greater among the Sokulks.

An additional instance of dental pathology is seen in two cases of hypercementosis, or thickening of the cementum clothing the roots. These cases occurred in No. 20 (over 40 years of age) and No. 34 (over 26 years). They were discovered only because the teeth in question had become separated from their sockets. It is highly probable, therefore, that hypercementosis is also present but unobservable without recourse to X-rays in a number of teeth still in their sockets. According to Pedersen (1949, p. 199), hypercementosis is a secondary root change occurring during adult life, and is so widespread among Eskimo that it may be considered normal for them. He gives no opinion as to the causes. It is conceivable, however, that a heavy deposition of cementum is a functional response to years of vigorous chewing, and to stress changes through wear.

COMPARATIVE ANALYSIS

RACIAL

On the basis of an admittedly inadequate series of 8 male and 7 female skulls designated as "Sahaptin and Salish" from Washington and Oregon, Hrdlička (1927, p. 90) briefly characterized the cranial type as follows:

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[6] So identified by Coues, 1893, vol. 2, p. 637 fn. Possibly the Sokulks are to be equated with the Walula.

[7] Coues, 1893, vol. 2, pp. 639–640. It is also most probable that in the process of drying, the salmon receives a heavy surface sprinkling of abrasive particles blown in by the wind.

High meso- to brachycephaly
Good skull capacity
Large and especially broad face
Medium to high orbits
Relatively narrow to medium nose
Medium to rather high vault, with one exception

Stewart (1950, p. 386) suggested that a relatively low vault and a narrow nose appear to be characteristic of skulls from the Pacific Northwest.

With due allowance for sampling errors, the Berrian's Island series fits most of these characterizations, especially the narrow nose, considerable facial dimensions, and borderline brachycephaly. The meager data at hand suggest, however, that the series is medium rather than low vaulted. Even an allowance of one or two index units in the mean height index for several of the skulls with slight occipital flattening leaves them still in the medium category. Furthermore, the mean basion-porion height of 21.28 mm. for Berrian's Island males, corrected to 20.58 mm. to conform with Neumann's technique, falls midway between his low-vaulted Apaches (16.31 mm.) and his high-vaulted series from Indian Knoll (24.59 mm.) (Neumann, 1942, p. 189).

Neither Hrdlička nor Stewart attempted to fit this Washington-Oregon cranial type into any more comprehensive framework of aboriginal North American races. Even with the additional information provided by the Berrian's Island series, I do not feel justified in going much further than they did. In casting about to see what generalizations I could make from thirty-odd skulls, I found several points worthy of comment in the continental schemes of Von Eickstedt (1933, pp. 690–696) and Neumann (1952). Von Eickstedt's map (opposite p. 704) shows a transition between the more westerly Pazifide type and the more easterly Silvide type at almost precisely the location of the Berrian's Island series on the Middle Columbia. If there is any basis for the position of this transition line, and none is stated, then most of the Middle Columbia Sahaptin-speakers should have been Pazifides, while the Upper Columbia peoples should have been Silvides. While there is no reason that this should not be true, some definite proof is needed.

Neumann's writings concerned with the racial history of the Pacific coast give the impression of great racial complexity for that area. Unfortunately he has at different times used two sets of type names, neither of which he has explained in full. It is difficult, therefore, to closely interpret what he has to say. He notes the presence of "an older dolichocranial stratum from British Columbia to Central America," Von Eickstedt's Margide gruppe, which Neumann feels is a too inclusive category (Neumann, 1946, p. 27). The California Mission Indians, the Pima and Papago, and the several extinct tribes of Lower California may represent parts of this older dolichocranial stratum. In addition, Neumann believes that within the northern portion of the Shoshonean area, Lenapid admixture extended to the Pacific coast (ibid.). Neumann's Walcolid type was early on the Pacific coast, especially if his assessment of Central Californian crania as Centralid is correct. McCown has recently demonstrated there was little physical change in Central Californian skeletal material spanning 2,000 to 3,000 years (McCown, MS.). In Neumann's view, a later southward expansion of Deneids overran much of the Pacific coast, showing a noticeable effect in northern California, and appearing in hybrid form among northern Shoshonean speakers (Neumann, 1946, p. 27).

With any or all four of Neumann's racial entities as potential contributors to the physical characteristics of the Middle Columbia people, to which of them does the Berrian's Island series show the closest relationships? I have eliminated the dolichocranic entities as principal contributors because of the probable high mesocranic headform of the Berrian's Island series. This leaves Neumann's Walcolid and Deneid types as the remaining candidates. In his thesis the type Walcolid series comes from a Middle Mississippi horizon in Illinois and the type Deneid series is from three separate localities. Metrically and morphologically the Berrian's Island series stands roughly intermediate between these two type series, closer if anything to the Walcolid series. What does this mean in terms of Neumann's classification? Three possibilities present themselves: (1) The Berrian's Island sample is too small to be properly representative and comparisons with other series are unwise; (2) the Berrian's Island series represents a Walcolid-Deneid hybrid population; (3) Neumann's type designations, based on 45 Illinois and 32 interior Salish, Haida, and Apache crania, may be too rigid to apply to other series, especially across considerable space and time.

This paper is not the place to examine and test the utility of Neumann's classification. It is apparent, however, that until we are provided with an analysis of the physical variability allowable within each type, no answers can be given to alternate explanations such as outlined above.

Passing on to the matter of stature, calculated means for the Berrian's Island males and females are respectively, 163.85 cm. and 150.51 cm. These means are very close to those I calculated for Krieger's Mamaloose Island people from the Lower Columbia: 18 males—163.77

cm; 15 females—151.55 cm. These male means fit well with Steggerda's map of North American Indian statures based on the living (Steggerda, 1932, p. 4). This map shows a wide tongue of 160–165 cm. male stature extending from the southern coast of British Columbia to the American Southwest. This tongue is surrounded by higher (165–170 cm.) statures.

DEFORMATION

The point is made previously (p. 211) that in all probability the Berrian's Island people would have passed as undeformed in the eyes of early travelers. The same sort of estimate was made for the historic Mamaloose Island series from the Lower Columbia, with the result that their deformation would have been very noticeable indeed. For 25 skulls, and with only 4 questionable cases, frontal deformation was the rule. Furthermore, in 12 cases, the frontal was definitely depressed, making for a concavity that would be very striking in the living. Table 7 shows the deformation, in form and degree, of the Mamaloose Island series. This table should be contrasted with table 4 to show the greater emphasis on head flattening among the downstream people.

This increased emphasis on head flattening was noted by Lewis and Clark on their downstream journey in 1805. Speaking of the Echeloots (Wishram), living at The Dalles, they stated,

> They also flatten the heads of their children in nearly the same manner [as the upstream Sahaptin-speakers]; but we now begin to observe that the heads of males, as well as of the other sex, are subjected to this operation, whereas among the mountains custom has confined it almost to the females. [Coues, 1893, vol. 2, pp. 672–673.]

It will be recalled that in the Berrian's Island series, more than twice as many female skulls as male showed fronto-occipital deformation, and that pronounced flattening occurred in six females as against one male. In the Mamaloose Island series the sex differences in this respect are leveled. This is in striking confirmation of Lewis and Clark's observations, which, in turn, are corroborated by the statements of other early travelers. Thus, after describing head flattening observed in 1810–13 among the tribes around the mouth of the Columbia, Ross (1849, p. 113) stated, "No such custom is practiced in any part of the interior." Townsend (1839, pp. 302–303) was first struck by head flattening among the Klickitat. He stated:

> About two miles below the cataract is a small village of Klikatat Indians. . . . A custom prevalent and almost universal amongst these Indians is that of flattening, or mashing in the whole front of the skull, from the superciliary ridges to the crown. . . . The flattening of the head is practiced by at least ten or twelve distinct tribes of the lower country, the Klikatats, Kalapooyahs, Multnomahs, Chinooks, Klatsaps, Klatstonis, Kowalitsks, Katlammets, Killemooks, Chekalis.

TABLE 7.—*Form and degree of deformation in the Mamaloose Island skulls*

	Male		Female		Total	
	Number	Percent	Number	Percent	Number	Percent
Fronto?-vertico-occipital:						
Slight	1	25.0	--------	--------	1	16.0
Medium	2		1	8.3	3	
Fronto-vertico-occipital:						
Medium	1	41.7	5	50.0	7	48.0
Pronounced	4		--------		4	
Very pronounced	--------	--------	1		1	
Parallelo-fronto-occipital:						
Pronounced	3	33.3	--------	--------	3	36.0
Very pronounced	1		5	41.7	6	
Total	12	--------	12	--------	25	--------

Also traveling downriver in 1835, Parker (1844, p. 144) remarked:

> A little above the Cascades, upon the north shore, there is a small village of Chenooks. These Indians are the only real Flatheads and Nez Percés, or pierced noses, I have found. . . . The flattening of their heads is not so great as generally supposed. From a little above the eyes to the apex or crown of the head, there is a depression, but not generally in adult persons very noticeable.

More details as to tribal practices may be gathered from the same travelers' accounts and from the Indians themselves. Lewis and Clark encountered the Chopunnish (Nez Percé) on the Snake and made no mention of head flattening among them. Yet Teit's informants indicated that the Nez Percé formerly used a pad over the infant's forehead for holding the head steady, and that many of them tightened the pad more than necessary for steadiness in order to intentionally produce head flattening (Teit, 1930, p. 168).

Lewis and Clark remarked on the Sokulks, Sahaptin-speakers of the Columbia-Snake juncture, stating of the women that—

> Their stature is low, their faces broad, and their heads flattened in such a manner that the forehead is in a straight line from the nose to the crown of the head. [Coues, 1893, vol. 2, p. 638.]

Farther downstream, some 36 miles below their October 18th camp, and therefore presumably just above Berrian's Island, Lewis and Clark met the Pishquitpahs, identified by Ray as Cayuse (Ray et al., 1938, p. 389). Ray also indicated that the Cayuse were located on the north bank of the Columbia from Alderdale to the mouth of the Umatilla at that time. Speaking of the Pishquitpah women, Lewis and Clark stated ". . . their cheek bones are high, their heads flattened . . ." (Coues, 1893, vol. 2, p. 650).

After seeing the Chinookan-speakers of the Lower Columbia and its mouth, Lewis and Clark revisited the Pishquitpahs on their way upstream. They stated that ". . . the heads of neither males nor females are so much flattened as those lower down the river" (Coues, 1893, vol. 2, p. 967).

Ray's informants on the Klickitat, Tenino, and Umatilla deny that head flattening was ever a custom among them (Ray, 1942, p. 171). For the Klickitat, this is contrary to Townsend's observations (see p. 219). In agreement with Lewis and Clark's observations cited above, the Wishram indicated that "frontal flattening was orthodox and preferable to a normal head. Everyone had it: 'they did not like to see round heads.' If its head should not have a flattened forehead, it would have been laughted at" (Spier and Sapir, 1930, p. 256).

From these reports and from the cranial series in question, it is apparent that in the first half of the 19th century, The Dalles marked the approximate dividing line between the heavy, prestige-giving head flattening of the Lower Columbia Chinookan-speakers and the much less intense, indeed perfunctory, treatment rendered by the Middle and Upper Columbia Sahaptins. It seems likely that the prestige of having a properly flattened head is tied in with the Lower Columbia concepts of hereditary rank and class. Ray shows that these concepts were lacking in the Middle and Upper Columbia Sahaptins (1939, pp. 25–26). Among the Sahaptins, however, the use of a cradleboard to immobilize the infant would result in some flattening, especially of the occiput. This might be wholly unintentional, although we know from Lewis and Clark's remarks (see p. 220) that some effort was made to produce fronto-occipital deformation in female infants. It seems likely, therefore, that the denial of Umatilla and Tenino informants that their people ever practiced head flattening only means that they did not emphasize the practice in proper Chinookan manner. The exact nature of the Chinookan practice, in contrast to the perfunctory Middle Columbia custom, is noted in some detail by Cox (1832, pp. 274–275) and Ross (1849, p. 113). But the best description of the head flattening technique comes from the Wishram, through Spier and Sapir (1930, pp. 255–256). They describe the cradle in detail, indicating that a soft pad for the back of the head was lashed to the cradle:

> Frontal flattening was accomplished by placing a cloth on the forehead, then a soft pad as big as a hand; then a broad band bound the whole to the [cradle] board (probably to holes in it). McGuff stated that a strip of buckskin about four inches wide was folded into a square, four by four inches. This was placed on the forehead of the securely laced baby, then another piece of buckskin was strapped over the head. As the child grew, the flattening device was tightened. Only certain persons could be entrusted with this task; not every mother could undertake it, for she might lace it so tightly as to kill the child. The flattener was not put in place until the baby was two or three weeks old, and was continued in use for eight to ten months.

SUMMARY

This report is based on the skeletal remains of 57 individuals from the 45-BN-3 plank cists on Berrian's Island, Washington State. Over one-third of these individuals are subadults. The adult group of 37 individuals provides 10 male and 8 female skulls sufficiently intact for measuring. The entire collection represents a historic Middle Columbia tribe who buried on Berrian's Island during the latter half of the 18th century. Tribal identification is uncertain, and the cist burials could have been made by any one of the Middle Columbia Sahaptin groups.

Metrically the series are on the meso- to brachycranic borderline. Meager evidence suggests a skull vault of medium height. Most striking is the pronounced forward and lateral jut of the malars, the deepness of the lower jaw at midline (especially in males), the narrowness of the nasal aperture, and the prominence of the nasalia. Estimated stature is medium for American Indians: 163-164 cm. for males, 150-151 cm. for females. In their mean measurements and indices, the Berrian's Island skulls are similar to the small Sahaptin and Salish series described by Hrdlicka. The relationship of these series to the North American racial varieties used by Von Eickstedt and Neumann is by no means clear.

All of the skulls show artificial cranial deformation, which is slight enough in seven cases to closely approximate the natural form of the vault. One-third of the skulls, of which 6 out of 7 are males, show only simple and probably unintentional flattening of the occiput. The rest (11 females, 5 males) show the fronto-vertico-occipital variety of intentional deformation. It is most significant that more than twice as many female as male skulls have fronto-occipital deformation, and that throughout they are the more highly deformed. This is precisely the observation of Lewis and Clark and other early travelers on the Middle Columbia. In fact, heavy Chinook-type deformation of both sexes, often featuring a depressed frontal, does not seem to have been encountered above The Dalles. A historic series of skulls from Mamaloose Island, Cascades area, confirms the greater emphasis on deformation among the Lower Columbia tribes.

Pathological changes are rather infrequent in the Berrian's Island skeletons, and are almost wholly confined to middle-aged (36-55 years) or older individuals. Since a higher proportion of the older individuals are male, the most severe skeletal pathology is largely confined to that sex. Taken as a group, the incidence of traumatic injuries is slight; there are no cases of skull fracture. Infections of an arthritic nature, usually involving the vertebrae, were the most frequent. Osteomyelitic infections occur in two cases.

Heavy tooth wear, where all the enamel has been ground off the molar surfaces, occurs in 25 out of 29 skulls. Dental caries is infrequent, occurring only in 13 out of 30 individuals or 4 to 5 percent of the teeth. When present it was almost invariably due to pulp exposure caused by heavy wear.

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APPENDIX 2

REPORT ON TRADE GOODS

By Arthur Woodward
Los Angeles County Museum, Los Angeles, Calif.

Beads.—In general all of the beads submitted fall within the same period, i. e., the 1790's to the 1830's. Beads of a similar type have been found in the Yokuts Indian cemetery at Elk Hills, Kern County, Calif. The small white and blue beads from McNary fall into the same category as those from burials G–60 A from Elk Hills dating around 1806–21. The small blue, barrel-shaped bead (pl. 29, *a*, 1) at the end of the strand 45 BN 3/727 should fall a trifle earlier, say around the 1790's to 1800. However, there were lags in certain types of beads, hence this particular style bead may well have carried over into the 19th century. The larger blue glass beads may well fall within the 1820's, 1830's, and even later into the 1850's.

The large flat glass bead (pl. 29, *a*, 8) is one which I have not encountered and until I can get more corroborative evidence I would hesitate to date it. My feeling is that it falls within the period 1810–30.[1]

Flint lock hammer.—This is a portion of a lock used on a hunting rifle, not military. It may be English or American ca. 1780–1810. (Pl. 31, 30.)

Iron blade.—This is listed 473, knife blade. It may well have been used as a knife blade, but it appears to be the broken tip of a sword reworked as a knife. The date is uncertain. (Pl. 31, 27.)

Buttons.—The large flat brass button with a stamped design on the surface (pl. 32, *b*, 9) is of a type which I would catalog as the omega or O-type button following D. F. Johnson's description, or possibly late A-type. In this instance the button was machine stamped (hand machine) and the face apparently die punched. I would say it was probably late 18th century, about 1790–1800 or perhaps even a trifle later. The other two buttons (pl. 32, *b*, 6, 11) are of the trombac or T-type and although these came in during the latter half of the 18th century, certain ones have been known to persist as late as 1830. Apparently these buttons are of the metal known as white copper (arsenic added to the brass gave it a pseudo silver appearance). Again the dates for these two buttons would probably be 1790–1810.

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[1] See Osborne's observation on this item (p. 98).

Buttons numbered 45 BN 3/111, 45 BN 3/697 and 148 (pl. 32, *b*, 8, 10), as well as the thin specimen 138 which does not seem to be a button at all, may have been part of a cheap whistle.

The buttons may date from late 18th century; on the other hand many buttons of this sort continued to be sold to Indians long after the close of the 18th century. Hence, in a sense, the period of manufacture need not correspond with the period of distribution. The same comment holds true for the Chinese porcelain pendant.

Porcelain pendant.—According to Gregor Norman Wilcox, of the museum staff, who has specialized in ceramics, the fragment is late 17th century Ming.

Musket ball.—Weight about one-half ounce, from a rifle or musket of .51 or .52 caliber. No further data given. (Pl. 30, 11.)

APPENDIX 3

REPORT ON THE COMPOSITION OF INDIAN COPPER BEADS FOUND AT THE McNARY DAM, OREGON

By W. J. Kroll

United States Bureau of Mines Laboratory, Albany, Oreg.

The copper beads, sent by the River Basin Surveys of the Smithsonian Institution for analysis, were first measured with a caliper. They were found to be of even thickness, 0.02 to 0.025 inch. This suggests that they were probably made from strips, obtained by rolling. It is not known whether the Indians had small rolling devices. The fact that rolled copper was used strongly suggests that the material was of European origin, and brought in by traders.

The samples the numbers of which could not be identified were not considered in the following tests. All the others were examined with the spectrograph. A table showing the spectrographic results is given (pp. 230–231). Samples having about the same composition, as shown by the spectrograph, were assembled to obtain enough material for a chemical analysis, and the numbers of these samples are given in another table (p. 229). Their chemical analysis showed the following composition:

Bi 0.010 percent
As 0.070 percent
Pb 0.110 percent
Ag 0.04 percent
S 0.007 percent

DISCUSSION

The date of the introduction of the aqueous electrolysis for copper gives the fairly reliable age limits for copper materials. Only very few other copper grades can compare with electrolytic copper as to purity. S. L. Archbutt [1] gives the following composition of electrolytic copper:

Bi nil
As 0.0015 percent
Pb nil
Ag 0.0010 percent
S 0.0030 percent

A comparison of this analysis with the one of the Indian copper given above shows that the latter was certainly not put through the electrolysis. This means that it is older than 66 and 80 years, respectively, since the first copper electrolysis worked in the United States of America in 1883, and in England in 1869.

Not all kinds of copper are put through the electrolysis, the cost of this operation being usually carried by the noble metal content.

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[1] S. L. Archbutt and W. E. Prytherch: Effect of impurities in copper. British Non-ferrous Metals Research Association, monograph No. 4. London. 1937.

Therefore, copper, low in noble metals, is usually only fire refined. With 0.040 percent silver, that was found in the Indian copper, the electrolysis would certainly have been employed, if available, to recover the silver. This eliminates the possibility that "fire refined" copper of recent production was used for the beads.

Native copper, which was found at Lake Superior is very pure. According to H. O. Hofman,[2] a copper content of 99.92 percent can be expected in native copper, the main impurities being nickel, bismuth, and arsenic. The Indian beads, as shown by the analysis, are much too impure to originate from native copper. A metallographic examination disclosed the presence of cuprous oxide, suggesting that the copper had been fused. Leaded copper becomes ductile in the presence of oxide.

Another supposition would be that the Indian copper was made from oxydic American ores, by reduction with the blowpipe. The rather low sulfur content would be in favor of this supposition. There are oxidic copper ores in the Western United States, especially malachite, which is a carbonate-hydroxide, and cuprite, which is an oxide. A comparison of the Indian copper with such ores is unfortunately not possible, since in the blowpipe reduction, arsenic, antimony, lead, iron, and some nickel may be bessemerized out.

CONCLUSIONS

The copper of the Indian beads originates probably from Europe, since the beads, which are of even thickness, show evidence of rolling procedures. The time of the importation to the United States can be given as prior to 1883, the date at which the first American copper electrolysis went into operation. The possibility that fire-refined, relatively recent copper was used, has also to be discarded because of the relatively high silver content of the beads. The impurities contained in the Indian copper beads rule out the use of Lake Superior native copper. Nor is it probable that the material was made by blowpipe methods from oxidic American copper ores, if the Indians did not possess devices to evenly roll such copper.

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[2] H. O. HOFMAN: Metallurgy of copper. P. 66, 2d ed., rev. by C. R. Hayward, New York. 1924.

Samples taken for chemical analysis

(Bi, As, Pb, and Ag determinations)

Spectrographic laboratory No.:	*Sample No.*
1242	45/BN-3/34
1244	45/BN-3/44
1247	45/BN-3/57
1248	45/BN-3/58
1249	45/BN-3/71
1257	45/BN-3/129
1258	45/BN-3/131
1264	45/BN-3/739 (3)
1265	45/BN-3/739 (4)
1266	45/BN-3/739 (5)
1267	45/BN-3/739 (7)
1268	45/BN-3/739 (8)
1270	45/BN-3/739 (11)
1271	45/BN-3/739 (12)
1272	45/BN-3/739 (14)
1274	45/BN-3/739 (16)
1275	45/BN-3/739 (17)

(S determination)

1246	45/BN-3/50
1247	45/BN-3/57
1252	45/BN-3/120
1256	45/BN-3/128
1261	45/BN-3/134

Report on the composition of Indian copper beads, Spectrographic Laboratory, U. S. Bureau of Mines, Albany, Oreg., Sept. 29, 1949 [1]
(Signed: D. W. Mortimore for Stephen M. Shelton)

SL. No.	Sample	Al	Ca	Cu	Mg	Ag	Zn	Cr	Fe	Mn	Mo	Ni	Si	Ti	Sn	Bi	Wa	Zr	As	Pb	Sb
1242	45/BN-3/34	F	E	A	G	F	ND	ND	ND	ND	ND	F	F	ND	ND	E	ND	ND	D	E	ND
1243	45/BN-3/38	F	E	A	G	E	ND	ND	ND	ND	ND	E	F	ND	ND	E	ND	ND	ND	D	E
1244	45/BN-3/44	F	E	A	G	F	ND	ND	ND	ND	ND	F	F	ND	ND	E	ND	ND	D	E	ND
1245	45/BN-3/47	F	E	A	G	E	ND	ND	ND	ND	ND	E	F	ND	D	E	ND	ND	D	D	E
1246	45/BN-3/50	F	E	A	G	F	ND	ND	ND	ND	ND	F	F	ND	ND	E	ND	ND	D	ND	ND
1247	45/BN-3/57	F	E	A	G	F	ND	ND	ND	ND	ND	F	F	ND	ND	E	ND	ND	D	E	ND
1248	45/BN-3/58	F	E	A	G	F	ND	ND	ND	ND	ND	F	F	ND	ND	E	ND	ND	D	E	ND
1249	45/BN-3/71	F	E	A	G	E	ND	ND	ND	ND	ND	E	F	ND	ND	E	ND	ND	D	E	ND
1250	45/BN-3/75	F	E	A	G	F	ND	ND	ND	ND	ND	E	F	ND	ND	E	ND	ND	D	D	E
1251	45/BN-3/80	F	E	A	G	F	ND	ND	ND	ND	ND	E	F	ND	E	E	ND	ND	D	D	E
1252	45/BN-3/120	F	E	A	G	F	ND	ND	ND	ND	ND	E	F	ND	E	ND	ND	ND	ND	D	ND
1253	45/BN-3/121	F	E	A	G	F	ND	ND	ND	ND	ND	F	F	ND	E	ND	ND	ND	ND	E	ND
1254	45/BN-3/124	F	E	A	G	G	ND	ND	ND	ND	ND	E	F	ND	ND	ND	ND	ND	D	ND	ND
1255	45/BN-3/125	F	E	A	G	F	ND	ND	ND	ND	ND	E	F	ND	E	ND	ND	ND	ND	ND	ND
1256	45/BN-3/128	F	E	A	G	F	ND	ND	ND	ND	ND	E	F	ND	ND	E	ND	ND	D	ND	ND
1257	45/BN-3/129	F	E	A	G	F	ND	ND	ND	ND	ND	E	F	ND	ND	E	ND	ND	D	E	ND
1258	45/BN-3/131	F	E	A	G	F	ND	ND	ND	ND	ND	F	F	ND	ND	E	ND	ND	D	E	ND
1259	45/BN-3/132	F	E	A	F	F	ND	ND	ND	ND	ND	E	F	ND	ND	E	ND	ND	D	ND	ND
1260	45/BN-3/133	F	E	A	F	E	ND	ND	ND	ND	ND	F	F	ND	ND	E	ND	ND	ND	D	ND
1261	45/BN-3/134	F	E	A	G	F	ND	ND	ND	ND	ND	E	F	ND	ND	E	ND	ND	D	ND	ND
1262	45/BN-3/136	F	E	A	G	F	ND	ND	ND	ND	ND	F	F	ND	ND	ND	ND	ND	D	ND	ND
1263	45/BN-3/739 (2)	F	E	A	G	F	ND	ND	ND	ND	ND	F	F	ND	ND	E	ND	ND	D	ND	ND
1264	45/BN-3/739 (3)	F	E	A	G	F	ND	ND	ND	ND	ND	F	F	ND	ND	E	ND	ND	D	E	ND
1265	45/BN-3/739 (4)	F	E	A	G	F	ND	ND	ND	ND	ND	F	E	ND	ND	E	ND	ND	D	E	ND

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[1] In addition to the elements given above these samples were examined for the following elements, which were not detected: Be, Cd, Co, Hg, Ba, Li, Sr, Cb, Ta, W, Ge, Ga, Au, Pt, and In.

Key: A, over 10 percent; B, 5 to 10 percent; C, 1 to 5 percent; D, 0.1 to 1 percent; E, 0.01 to 0.1 percent; F, 0.001 to 0.01 percent; G, under 0.001 percent; ND, not detected.

Report on samples[1] *having about the same composition, Spectrographic Laboratory, U. S. Bureau of Mines, Albany, Oreg., Sept. 30, 1949*
(Signed: D. W. Mortimore for Stephen M. Shelton)

SL. No.	Sample[2]	Al	Ca	Cu	Mg	Ag	Sn	Cr	Fe	Mn	Mo	Ni	Si	Ti	V	Bi	Na	Zr	As	Pb
1266	45/BN-3/739 (5)	F	E	A	G	F	ND	ND	ND	ND	ND	F	E	ND	ND	E	ND	ND	D	E
1267	45/BN-3/739 (7)	F	E	A	G	F	ND	ND	ND	ND	ND	F	F	ND	ND	E	ND	ND	D	E
1268	45/BN-3/739 (8)	F	E	A	G	F	ND	ND	ND	ND	ND	F	F	ND	ND	E	ND	ND	D	E
1269	45/BN-3/739 (10)	F	E	A	G	F	ND	ND	ND	ND	ND	E	F	ND	ND	E	ND	ND	D	E
1270	45/BN-3/739 (11)	F	E	A	G	F	E	ND	ND	ND	ND	F	F	ND	ND	E	ND	ND	D	E
1271	45/BN-3/739 (12)	F	E	A	G	F	ND	ND	ND	ND	ND	F	F	ND	ND	E	ND	ND	D	E
1272	45/BN-3/739 (14)	F	E	A	G	F	ND	ND	ND	ND	ND	F	E	ND	ND	E	ND	ND	D	E
1273	45/BN-3/739 (15)	F	E	A	G	F	ND	ND	ND	ND	ND	E	F	ND	ND	E	ND	ND	D	ND
1274	45/BN-3/739 (16)	F	E	A	G	F	ND	ND	ND	ND	ND	E	F	ND	ND	E	ND	ND	D	E
1275	45/BN-3/739 (17)	F	E	A	G	F	ND	ND	ND	ND	ND	F	F	ND	ND	E	ND	ND	D	E
1276	45/BN-3/739 (18)	F	E	A	G	F	E	ND	ND	ND	ND	E	E	ND	ND	E	ND	ND	D	E
1277	45/BN-3/739 (19)	F	E	A	G	F	E	ND	ND	ND	ND	F	F	ND	ND	ND	ND	ND	ND	E

[1] In addition to the elements given above, these samples were examined for the following elements, which were not detected: Sb, Be, Cd, Co, Hg, Ba, Li, Sr, Cb, Ta, W, Ge, Ga, Au, Pt, and In.

[2] Figure in parentheses indicates number of samples.

Key: A, over 10 percent; B, 5 to 10 percent; C, 1 to 5 percent; D, 0.1 to 1 percent; E, 0.01 to 0.1 percent; F, 0.001 to 0.01 percent; G, under 0.001 percent; ND, not detected.

APPENDIX 4

EXAMINATION OF COPPER ARTIFACTS FROM THE McNARY SITE, OREGON

By B. H. McLeod
Consulting Metallurgist

Eight specimens of copper artifacts from the McNary site near Umatilla, Oreg., have been examined. The material consisted of five copper tube beads and three pieces of flat metal.

The tube beads were marked as 45–BN–3/746–5–6–12–61 and 63. Two pendants were marked 45–BN–3/153 and 435 and a piece of copper sheet 45–BN–3/107.

All of the specimens showed some corrosion, the copper being oxidized mostly to malachite. Beads 12 and 63 and the piece of copper sheet showed more cupric oxide than carbonate. This oxidation to cupric oxide or black oxide was probably brought about by heat. Small amounts of cuprous oxide were found on the surface of all specimens.

Generally speaking, the thickness of the metal is very consistent in each specimen, and the impression obtained from the examination of sections is that the copper sheet from which the pieces were fabricated was rolled rather than hammered. The average thickness (including corrosion) of the various pieces of copper is given below:

	Mm.
45–BN–3/153	0. 59
45–BN–3/107	. 62
45–BN–3/435	. 75
45–BN–3/746–5	. 44
45–BN–3/746–6	. 42
45–BN–3/746–12	. 46
45–BN–3/746–61	. 46
45–BN–3/746–63	. 33

The variation in thickness of the individual specimens is less than +0.05 mm. Some of the variation is due to more or less oxidation and corrosion rather than to more or less rolling or hammering. The accuracy with which the sheets have been gaged precludes the argument that stone implements had been used and indicates the use of rolls to reduce the thickness of the copper; this would almost prove the point that the copper comes from white sources and is not prehistoric.

Examination of the surface of the beads shows plainly in several instances that the outer edge of the copper sheet was shaped before the completion of the bead. The edges have been smoothed by filing or grinding at right angles to the edge of the sheet. Abrasive marks can be seen on the outside edges but they do not extend in any case to that part of the bead on which the edge was rolled. In most cases both edges were shaped before the tube was rolled. Several methods of rolling the bead could have been used, but I have reason to believe that it was done somewhat like the following:

A sheet of copper as wide as the bead was used to make them, and the end of the sheet was hammered flat and more or less peened out on the edge. Rolling was then started by hammering the edge of the sheet over some round object. When the roll or the circle was completed a knife blade was run down the length of the roll using the rolled part of the bead as the guide. The bead and the sheet were then worked back and forth until the copper broke. The rough edge was then ground or filed off and the bead completed by hammering or pressure. The supporting evidence for this theory is that an examination of the insides of the beads shows that the inside of the inner edge has a burr, such as would have been formed by working copper sheet back and forth, and that this burr has been hammered flat. These burrs would have been produced by the cutting off of the bead made before the one described. Further evidence is that several cuts such as would have been made by a knife blade have been observed on the inside of two beads. Also that the shape of the cross section of the outer edge of the bead is such as would have been formed by the method described. I do not believe that the copper was rolled around a metal rod and hammered on the rod to shape it because there is no indentation of either the outside or inside of the edge of the copper on the corresponding part of the rolled bead. It is nearly certain that the copper is of white source and it is quite probable that the beads were of native manufacture.

Microscopic examination of sections of the beads and flat metal revealed some interesting but at the same time rather confusing information. I had no facilities for making a complete chemical analysis of the copper which might have shown some differences in the copper. However, microscopic examination of polished sections shows that the copper is very bad from present day standards. It is very impure and contains much oxygen as elliptic and flattened inclusions of ruby red cuprous oxide. This is definitely indicative that the copper was smelted or melted. On first examination one is struck by the extreme impurity of the metal. Examination of all 8 pieces shows that, with the possible exception of specimens 63 and 12, all of the pieces of copper are different. Photomicrographs, at 115 magnifications of polished sections unetched, are presented of beads 6, 61, and 63, and of sheet and pendants 107, 153, and 435. With the exception of No. 107, the specimens including those not photographed all show the flattened inclusions arranged in a flowlike structure parallel to the direction of elongation or rolling. (Pls. 39 and 40.)

I do not understand No. 107. It appears not to have been hammered or rolled, as the inclusions have not been flattened and yet the sheet has a very even thickness and certainly has been fabricated from a piece of molten copper. Photograph 107 etched makes it look as if the copper had not been hammered or annealed. Examination of the exterior of the sheet shows that it had been heated very hot in an oxidizing atmosphere, which fact is borne out by the intruding copper oxide at the crystal interface as shown in the edges of the unetched specimen. It is possible that the cuprous oxide inclusions contain sufficient impurities to lower the melting point of the mixture and that when the sheet was heated to a high temperature not only did the crystal structure reform, but the inclusions reached a very nearly spherical shape.

All the other specimens have the same characteristics when etched as is shown in photographs of 63, 153, and 435. They have flattened inclusions and reformed crystals due to annealing after hammering or rolling. Pendant 153 shows some distortion of crystals after annealing possibly due to bending during use.

Having no specimens of copper that might have been produced at the time the beads were made, it was not possible to make any comparison of the purity and type of copper made in those days.

It is interesting that so many different grades of copper were found in the eight specimens. Each one probably represents a different melt, so that unless a lot of beads were made from one melt then the melts themselves must have been small. I am not familiar with copper metallurgy of, say, 150 years ago and have never examined any, and I doubt if more than 100 pounds of copper was produced at one melt. It is of course possible that the copper sheet was not imported, but that the copper was produced locally, in this case the melts might have been very small—not more than a few pounds at a time. If there is any evidence of this, it might account for the copper being different in such a high percentage of the specimens.

These two metal analyses supplement one another and agree, as indeed Mr. Woodward (p. 225) and Mr. Williams (p. 107) did, on the buttons. Kroll's laboratory indicated that the chemical variance was less, it seems to me, than McLeod's work brought out in the physical. There has been established here a firm basis for further work with trade and native metals in the Northwest.—D. OSBORNE.

APPENDIX 5

LIST OF REPORTS, ARTICLES, AND NOTES RELATING TO THE SALVAGE PROGRAM PUBLISHED IN OTHER SERIES

Adams, William Richard.

1946. Archeological survey of Martin County. Indiana Hist. Bull., vol. 23, No. 6, pp. 193–226.

1949. Archeological notes on Posey County, Indiana. Indiana Hist. Bur. Indianapolis.

Baby, Raymond S.

1946. Survey of Delaware Reservoir Area. Museum Echoes, vol. 19, No. 8, Serial No. 208.

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EXPLANATION OF PLATES 1–32[1]

Plate 1

45–BN–53. *a*, Central portion of site showing excavation in progress. Looking south. *b*, View looking up river.

Plate 2

45–BN–3. *a*, Looking west from alidade station. *b*, Looking east across washout.

Plate 3

a, 45–BN–3, washout to the west, looking southwest. *b*, 45–BN–53, house pit 11 cleared and with central trench staked, looking west.

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[1] Artifacts in plates are all numbered with 1-inch squares of coordinate paper. Thus each article has its scale. Metric usage is often employed for the same objects in the text. Both figures are thus available.

PLATE 4

45–BN–53, house pit 42. *a*, Horizontal section at —9.5 DD, looking east. *b*, Horizontal section at —10.5 DD, looking east.

PLATE 5

45–BN–53, house pit 49. *a*, First level of windblown material removed from western half, looking west. *b*, Central fire and debris area; first, second, and third fills. Squares 15 and 16, looking southwest.

PLATE 6

45–BN–53, house pit 49. *a*, After removal of first fill at —7.0 DD, looking southwest. *b*, Profile at 14R1 and stake column 16 c/L; looking east.

PLATE 7

a, 45–BN–53, house pit 70 at beginning of clearing, first man in center, second on north rim; looking north. *b*, 45–BN–3, fragmentary and disturbed burials in washout pit; looking west.

PLATE 8

45–BN–3, burial 7. *a*, Disturbed burial in washout pit. To south-southwest. *b*, Artifacts accompanying burial: 1, *Glycymeris* shells (cat. No. 261); 2, *Glycymeris* and *Olivella* (225); 3, *Glycymeris* (233); 4, *Glycymeris* and mussel (231); 5, *Glycymeris* (230); 6, *Glycymeris* and *Olivella* (226); 7, *Glycymeris* (229); 8, *Haliotis kamchatkana* pendant (244); 9, copper tube bead (234); 10, copper tube bead (237); 11, copper tube bead (228); 12, *Haliotis kamchatkana* pendant (260); 13, spatulate bone (227); 14, spatulate bone (246); 15, bone flesher-adz (32); 16, end of antler, worked (250); 17, Type I ka knife or spear point (186); 18, broken tip, Type I k (252); 19, broken base, Type I k (?) (249); 20, Type I s (253); 21, Type I sb (248); 22, Type I sb (236b); 23, Type I sa (31); 24, Type I sb (245); 25, Type III a (247); 26, Type I sb (30); 27, Type I s (236a); 28, Type I sa (29); 29, broken piece, small jadeite celt (235), see plate 19, *b*, 6; 30, short quartzite pestle (232 and 242); 31, Type II c (33).

PLATE 9

45–BN–3. *a*, Burials 12, 13, 14, disturbed, in washout. Note nest of skulls, probably fortuitous. To northeast. *b*, Burial 17. To south. Fully flexed burial on right side.

PLATE 10

45–BN–3, burial 23. *a*, Plank cist completely cleared. To northwest. *b*, Plank cist. To east.

PLATE 11

45–BN–3, burial 23. *a*, Burial and cist, profile. Note human rib in fill of grave. Grave sides only slightly truncated. To north-northwest. *b*, Semiflexed burial, head northeast. Decayed matting in background by right arm.

Plate 12

45–BN–3, burial 25. *a*, Fully flexed burial, head west; a poor burial with many artifacts. Dark outline but no cist remnants at burial level. *b*, Artifacts accompanying burial: 1, iron knife blade (473); 2 and 3, iron and bone or wood pipestem (707 and 706); 4, iron bracelet (529); 5, iron ferrule (476); 6, matting (639); 7, fish bone (705); 8, *Olivella* and juniper seed beads (484); 9, hawk claws (543); 10, canine (Canus?) (539); 11, *Olivella* and juniper seed beads (544); 12, bone beads (538); 13, wolf (?) canines and bone bead (516); 14, elk incisor (527); 15, bear canines (525); 16, bear (?) claw cores (693); 17, carved bones (528); 18, iron pieces (540); 19, scraper (477); 20, chipped flake (541); 21, scraper (524); 22, Type I s (514); 23, chipped flake (523); 24, point of blade (519); 25, antler digging-stick handle (572); 26, 27, 28, "lucky stones" (475, 542, 522); 29, steatite spoon (514); 30, lucky stone (526); 31, steatite beads (464); 32, broken serpentine celt (517); 33, steatite tubular pipe (515); 34, 35, 36, "lucky stones" (520, 474, 521).

Plate 13

45–BN–3. *a*, Burial 33, semiflexed, with twined matting shrouds; head southwest. *b*, Burial 36, semiflexed; head northeast; a well-furnished burial.

Plate 14

45–BN–3. *a*, Artifacts accompanying burial 36: 1, hafted type I k blade (609); 2, tubular steatite pipe (607); 3, antler wedge or scraper (610); 4, antler wedge (?) (772); 5, file or whetstone (613); 6, green paint (tuffaceous sandstone) (616); 7, silver pendant (618); 8, *Olivella* shell (622); 9, limonite (611); 10, steatite pipe (628); 11, steatite pendant, pipe end (619); 12, worked bone (709); 13, carved bone bead (625); 14, coiled basketry fragment (624); 15, juniper seed beads (608); 16, worked flint (621); 17, worked flint (626); 18, worked chalcedony (627); 19, end of blade (620); 20, Type II b point (612); 21, Type II g point (614); 22, Type II point (632); 23, coiled basketry fragment (see also 14) (624). *b*, Artifacts accompanying burial 39: 1, broken antler digging-stick handle (582); 2, twined matting fragment (583); 3, broken digging-stick handle (569); 4, volcanic tuff arrow smoother (585); 5, volcanic tuff arrow smoother (640); 6, piece of wood (581); 7, dentalia, *Olivella* and juniper seed beads, elk canines (584); 8, disk shell bead (570); 9, piece of wood (581); 10, juniper seed and *Dentalium* beads (713); 11, red ocher (571); 12, chalcedony scraper (586) 13, 14, 15, "lucky stones" (564, 565, 589); 16, slate effigy (587); 17, 18, slate effigies with red ocher stains (590, 567); 19, 20, 21, slate effigies (588, 592, 566); 22, copper pendant (593–594); 23, pestle, broken, "killed," three pieces (641).

Plate 15

45–BN–3. *a*, Burial 41, semiflexed, head west; note artifacts. *b*, Artifacts accompanying burials 41 and 26. 1–8, artifacts with burial 41: 1, juniper seed beads (605); 2, *Olivella* beads (600); 3, 4, pair of volcanic tuff arrowshaft smoothers (595 and 596); 5, Golden Eagle ulna whistle (598); 6, green paint (tuffaceous sandstone) (606); 7, serpentine pendant (597); 8, petrified wood drill (599). 9–24, artifacts with burial 26: 9, river mussel shell (686); 10, red ocher (694); 11, broken point (502); 12, broken blade (503); 13, slate effigy (497); 14, chalcedony scraper (550); 15, volcanic ash (551); 16, piece of travertine (548); 17, hafted I k blade (501); 18, slate effigy (504); 19, slate effigy (553); 20, copper pendant (554); 21, bone awl (498); 22, bone pin (499); 23, antler wedge (?) (547); 24, antler wedge (500).

PLATE 16

45–BN–3. *a*, Burial 42, unusual position, head west, full flexure. Note tops of cist and remnants of cist of burial 46 (background) and artifacts. *b*, Burial 48, semiflexed, head northwest. Note the outline of bowl or more probably baskets over the abdomen. These were powdery and no parts of them were saved.

PLATE 17

45–BN–3. *a*, Artifacts accompanying burial 48: 1, small quartzite pestle (656); 2, 3, 4, 5, "lucky stones" (653, 4, 2, 1, 6); 6, slate effigy (675); 7, 8, 9, 10, 11, 12, 13, "lucky stones" (653, 10, 9, 3, 8, 5, 7, 16); 14, slate effigy (634); 15, "lucky stone" (653, 13); 16, slate effigy (655); 17, small blade, Type I k (660); 18, Type I sa point (659); 19, 20, "lucky stones" (653, 15, 17); 21, two bear canines (672); 22, human hair preserved by copper (652); 23, copper pendant, hair adhering (651); 24, broken beaver incisor die (676); 25, Type I sa point, crude (658); 26, broken beaver incisor die (716); 27, juniper seed beads (661); 28, digging-stick handle, decayed (657); 29, antler wedge fragment (771); 30, digging-stick handle, decayed (673); 31, seeds, from soil in basket (654); 32, fragment of a digging-stick handle (662). *b*, Burial 49, loose flexure, head northwest; note matting (679).

PLATE 18

a, Stone objects of general utility from both sites. 45–BN–53: 1, cobble hammerstone (6); 2, hammerstone or anvil (HP11/47); 3, hammerstone (6); 4, hammerstone (HP52/85); 5, cobble scraper (7); 7, hammerstone (19) 8, 9, cobble chopper (HP70/26, HP70/21); 11, 12, 13, choppers (5, 5, 5,); 14, 15, rectangular sinkers ? (6, 4); 16, 17, 18, rectangular sinkers (4, 4, 4); 21, chopper (HP52/39); 22, 23, 24, 25 small flake knives (17); 45–BN–3: 6, cobble scraper or small chopper (99); 10, cobble chopper (438), 19, fortuitous ? toothed flake (191); 20, chert core (4); 26, two-notched sinker (722 (23)); 27, four-notched sinker (3); 28, 29, 30, two-notched sinkers (3, 180, B5/177); 31, four-notched sinker, crude (193); 32, two-notched sinker, small (1 (11)). *b*, Heavy utility stone, 45–BN–53: 1, mortar base, II (HP42/69); 2, mortar base, II (HP49/55); 3, mortar base I (54); 4, broken pestle, crude (1 (5)); 5, broken pestle (1 (7)); 6, unfinished pestle (1); 7, crude or unfinished mallet-pestle (2); 8, broken basalt column pestle (1 (2)); 9, partly girdled sinker (15); 10, partly girdled sinker (15); 11, grooved pestle (1 (4)).

PLATE 19

a, Arrowshaft smoothers and small mallet pestle. 45–BN–3: 1, 2, pair of sandstone smoothers (294; B8/239–240); 3, 4, pair of volcanic tuff smoothers (B41/595–596); 5, 6, pair of sandstone smoothers (B11/270–271); 7, 8, pair of sandstone smoothers (B49/678 and 684); 10, fine basalt polisher (357); 12, 13, pair of volcanic tuff smoothers (B39/585 and 640). 45–BN–53: 9, diorite smoother (16); 11, small mallet-pestle, diorite porphyry (3). *b*, Fine ground stone. 45–BN–3: 1, chalcedony celt (B5/174); 3, scoria file (B24/531); 4, scoria file (B36/613); 5, serpentine celt, single bevel (B25/517); 6, serpentine celt (B7/267 and 235); 7, steatite spoon (B25/514); 8, short steatite pipe (B24/532); 9, long steatite pipe (B36/607); 10, steatite pipe (B36/628); 11, serpentine pendant (B41/597); 12, piece of steatite pipe (B12–14/367); 13, steatite pipe (272); 14, steatite pipe (B25/515); 15, steatite pipe, mouthpiece (B36/619); 16, steatite beads, flat (B25/464); 17, spherical steatite bead (727); 45–BN–53: 2, scoria file (HP52/22). All pipes were smoked with a stem.

PLATE 20

a, Slate effigies and "lucky stones": 1, 2, 3, 4, "lucky stones" (B48/653 (10, 9, 2, 6)); 5, effigy blank (B48/653 (16)); 6, 7, effigies (B48/675, 655); 8, 9, 10, 11, 12, 13, 14, "lucky stones" (B25/526, 475, 474, 542, 522, 521, 520); 15, "lucky stone" (B39/564); 16, 17, 18, 19, 20, small effigies (B39/566, 592, 567, 590, 587); 21, "lucky stone" (B12–14/381); 22, effigy, sun-dried clay (B12/301); 23, 24, small effigies (B26/504, 588); 25, atypical effigy (B26/553); 26, effigy (B26/497). *b*, Pestles: 1, long pestle "killed," basalt (B32/573); 2, long pestle "killed," diorite (B44/643); 3, long pestle "killed" diorite porphyry (B4/91); 4, short pestle, quartzite (B48/656); 5, short pestle, diorite porphyry (B43/663).

PLATE 21

a, 45–BN–3, mallet pestles: 1, 2, 3, nipple-topped bottle mallet pestles (B12/307, B12–14/254, B45/642). *b*, Chipped scrapers and flakes. 45–BN–3: 2, spokeshave flake (B36/627); 4, chipped flake (437); 5, scraper (B49/680); 6, scraper (B25/477; 7, scraper (151); 8, scraper (343); 9, scraper (B39/586); 11, scraper (430); 12, scraper (B25/540); 14, broken chipped flake (509); 15, broken chipped flake (722 (27)); 17, broken Type I k, petrified wood (86); 18, 19, 20, 21, Type I k, petrified wood (B12–14/370, F3/198, 456, B22?/485); 22, 23, tabular pieces of petrified wood, unworked (721). 45–BN–53: 1, spokeshave knife (11); 3, spokeshave knife (11); 10, scraper (HP42/79); 13, scraper (HP42/72); 16, broken chipped blade or end-sharpened core (HP49/37).

PLATE 22

Fine chipped stone. 45–BN–3: 1, Type I k (B5/175); 2, Type I k (B4/92); 3, Type I ka (B7/186); 4, Type I k (268); 5, Type I sa (B48/658); 6, Type I s (B12/311); 7, Type I kb (B37/603); 8, Type I sb crude (B7/253); 9, Type I sb crude (B7/236b); 10, Type I kd? (510–511); 11, Type I sa (B48/659); 12, Type I kc (699); 13, Type I kc (B25/518); 14, Type I sb crude (429); 17, Type II s (512); 19, Type II b (B36/612); 20, Type II a? (B12–14/369); 21, Type II a (B30/576); 22, Type II a (690); 23, Type II a small (545); 24, Type II c (F3/197); 26, Type II f (695); 27, Type II g (B36/632); 28, Type II d serrated (447); 29, Type III d (692); 30, Type III d (696); 32 graver (387); 33, Type II g (B36/614); 34, Type II g (604); 35, Type III a (B7/247); 36, Type III c (B24/533); 37, Type III c (B49/683); 38, Type III b (B12/302). 45–BN–53: 15, (HP42/68); 16, Type I? (HP70/30); 18, Type II a (12); 25, Type II fa (64); 31, graver (59).

PLATE 23

a, Antler and bone artifacts. 45–BN–3: 1, antler digging-stick handle (B44/644–5); 2, digging-stick handle (B25/572); 3, digging-stick handle (B4/93); 4, spatulate bone sewing or weaving tool (B7/246); 5, 6, 7, 8, 9, pieces of antler wedges (B36/772, B5/163, B4/83a, B8/258, B8/241); 10, imitation elk canine (of bone) (215); 11, elk canines (B39/584b); 12, hawk ? claw cores (B25/543); 13, Golden Eagle ulna whistle (B9/243); 14, Golden Eagle ulna whistle (295); 15, antler wedge (B48/771); 16, questionable piece of antler (B12–14/259) (266); 17, beaver incisors (B4/90); 18, awl (40); 19, awl (264); 21, bone flesher-adz, serrated bit (B7/32); 22, bone pin (296); 23, bone pin (B8/257); 24, broken bone awl (B44/650); 26, bone beads or counters (B1/700); 27, bone tube or bead (313); 28, bone tube or bead (B1/176). 45–BN–53; 20, splinter awl (80); 25, bone bead or counter (HP42/75); 29, elk ulna awl (HP49/53). *b*, Kingfisher beak in situ (45–BN–3/B24/535, 536).

PLATE 24

Shell and shell beads, 45–BN–3. *a*, Shells: 1, *Olivella biplicata* (B44/646); 2, *Olivella biplicata*, small (B22/463); 3, 4, disk beads (B46/670; 334); 5, disk bead (dark) (364); 6, *Dentalium* ? (B42/671); 7, *Dentalium pretiosum* (B50/403); 8, *Dentalium pretiosum* (754); 9, *Glycymeris subobsoleta* (B7/261); 10, *Dentalium pretiosum* (B22/462); 11, disk bead (365); 12, *Haliotis kamchatkana* pendant (322); 13, *Haliotis kamchatkana* pendant (B7/244); 14, *Haliotis kamchatkana* pendant (B4/88); 15, mussel shell ? (B12/305); 16, unio of pelecypod (B34/558); 17, *Haliotis kamchatkana* (B7/260); 18, *Juniperus occidentalis* beads (seeds) (B18/555). *b*, Shell beads: 1 (lower center), *Olivella biplicata* (B22/463); 2 (upper right), *Dentalium pretiosum* (B50/403); 3 (center), *Dentalium pretiosum* (B50/403); 4 (upper center), dentalia disks, *Dentalium pretiosum* (754); 5 (second from upper left), copper tube bead and disk (100), 3 cm. long; 6, (middle left), disk beads (B42/671); 7 (right) seed beads, *Juniperis occidentalis* (B18/555); 8 (lower left), disk bead (334); 9 (upper left), *Dentalium*? (B42/671).

PLATE 25

Perishable materials. *a*, 45–BN–3, *Dentalium* headband of burial 22 (enlargement of field photograph (B22/462)); *b*, 45–BN–53, twined rush matting (HP11/34); *c*, 45–BN–3, coiled basket fragment (B36/624).

PLATE 26

Hafted blades, 45–BN–3. *a*, Hafted blade, Type I k (B36/609); *b*, hafted blade, Type I kc (B25/518); *c*, hafted blade, Type I k (B26/501).

PLATE 27

45–BN–3. *a*. Twined basketry hat (enlargement of field negative; (B36/615)); *b*, twined mat fragment (B53/796).

PLATE 28

45–BN–3. *a*, Copper beads and cordage: 1 (724 (1)); 2, (746 (41)); 3, (724 (44)); 4, (724 (51)); 5, cord only (66); 6, (724 (14)); 7, (724 (24)); 8, (154b); 9, cord only (44). *b*, *Apocynum* cordage: 1, three-strand braid (750 (28)); 2, fine cord in seed bead; two-ply S-twist, diameter 2 mm. (B23/637); 3, spliced piece of cord, two-ply Z-twist, 5 cm. long (cord from 732); 4, most usual type of cord, two-ply, S-twist (cord from 735); 5, heavy cord, two-ply S-twist; each single two-ply Z-twist with singles of S-twist (cord from 732 (19)); 6, cordage, two-ply, Z-twist (cord from 724 (9)).

PLATE 29

45–BN–3. *a*, glass trade beads: 1, (727); 2, (748); 3, (49); 4, (755); 5, (763); 6, (765); 7, (427); 8, butterfly bead (B46/670); 9, (767); 10, (751); 11, (757); 12, (761). *b*, Brass and copper objects: 1, brass thimble (B15/345); 2, copper pendant (434); 3, copper pendant (B15/346); 4, hollow brass hemisphere, sawed and perforated, has appearance of part of brass saddle pommel (389); 5, ring and glass beads (740); 6, strip ring (384); 7, copper tinkler (327); 8, brass pendant (483); 9, initial stage of manufacture of brass tube bead 6.8 cm. long, 3.7 cm. wide, of 20 gage hard-tempered rolled brass. Bead was rolled and hammered on an anvil over a form, presumably a round stick or an arrow shaft. Anvil marks can be seen on the under side of the roll. Abrasive marks of a striker or punch of some type can be seen on the edge of tube lip just before it was tucked and rolled (318a); 10, hawk bell? (277); 11, brass musket butt plate (11 gage Brown and Sharpe), holes square-cut with metal chisel (356); 12, brass pendant, two rivets; ear of kettle? (B12–14/309); 13, pendant?, 19 gage—2 pound copper (Stub's gage) (407); 14, flattened coil copper wire (508); 15, pendant ? (B46/669); 16, copper pin (218); 17, pendant ?, 14 gage (Brown and Sharpe) sheet brass; square chisel cut holes (82); 18, flattened copper wire (724 (62)); 19, brass tube bead, 17 gage, rolled and pounded over form (759); 20, spoon or fork handle (65); 21, copper bead, shell bead and cord (see also pl. 24, *b*, 5) (100); 22, beads of sheet copper and brass (750).

Plate 30

Brass and copper trade artifacts, 45–BN–3. 1, brass pendant, weight 2 ounces (52); 2, copper pendant, weight 2 ounces (691); 3, copper pendant (292); 4, copper hammered, bar pendant, shape is that of double-bladed celt (B26/554); 5, brass pendant (B26/554); 6, 7, copper pendants with deep central boss (470, 426); 8, copper pendant, corrugated (425); 9, copper pendant, two corrugations (320); 10, embossed copper button ?, single central perforation (286); 11, musket ball, lead, about .50 caliber (633); 12, copper pendant (137); 13, copper pendant, punched decorations (332); 14, brass pendant cut and smoothed (207); 15, copper pendant, suspension hole formed by pounding, bending and overlapping parts of one end (B49/681): 16, copper pendant (410); 17, brass pendant; upper right corner is crimped over with a fragment of shell in the fold. The right-hand edge is rough and slightly bent, but the other three edges are ground down and smoothed. A bead has been glued or pressed into the fold to provide a hole for suspension (146); 18, copper button ? fragment (138); 19, copper pendant (287); 20, copper tube bead (156); 21, copper tube ring (102); 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, copper tube beads (145, 68, 735, 766, 213, 746 (10), 117, 746 (26), B12–14/371, 110, 724 (11)); 33, copper tube bead, corrugated before rolling (157); 34, copper tube bead, appears purposely crushed, broken, and bent (746 (7)); 35, this bead has been destroyed by four crimps or dents (746 (4)); 36, copper scrap (746 (84)); 37, copper tube bead fragment (746 (80)); 38, copper tube bead apparently deliberately crushed and destroyed, possibly "killed" and deposited at grave (746 (33)); 39, copper tube bead (89); 40, copper tube bead, crushed (746 (29)); 41, copper tube bead with folded lip, crimped and bent (118); 42, copper tube bead destroyed (728); 43, copper tube bead, four dents across bead, destroyed (724 (1)); 44, copper tube bead (746 (34)).

Plate 31

Ironware, 45–BN–3. See section entitled "Iron Objects," p. 98 seq.

Plate 32

45–BN–3. *a*, Ironware: 1, knife with seed beads adhering (B23/637); 2, bone core and iron case (pipestem?) (B25/707); 3, arrowpoint (B25/540); 4, arrowpoint (B25/540); 5, pipestem (B38/563). *b*, Sheet brass, copper and buttons: 1, left, 20 gage factory rolled brass; edges show cutting and breaking (288b); right, copper, possibly a flattened piece of kettle (318b); 2, silver fragment, perforated, curvilinear design impressed (409); 3, brass button; this type is the old colonial model of military button with the heavy eyelet and welded collar around base of the eyelet (149); 4, copper bead with glass bead on *Apocynum* cord (127); 5, pewter pendant (58c); 6, another pre-1800 colonial military-type button (181); 7, *Dentalium* partly telescoped into copper bead (211); 8, button of near Alpha type (Johnson, 1948, p. 13) (111); 9, copper button 3.1 cm. in diameter with a central medallion design and loop lines around the circumference. The shank has been broken and holes drilled for suspension. This has been identified as the earliest trade button of the series and carries a design very similar to the early pearl buttons of the 1720's. It was probably manufactured in England about 1780–90, possibly a little earlier (152); 10, copper button, 2.4 cm. in diameter, 4 mm. high and 0.3 mm. thick; known as Alpha type; second half of 18th century. Back of button is bossed and the pin shank was broken. The shank is of hand-drawn wire half-round in cross section and brazed to the back by its tips, permitting a small area of contact (Johnson, 1948, p. 12) (697); 11, silvery arsenic-treated brass button, Trombac class (Johnson, 1948, p. 12) (B9/263); 12, colonial type button (not easily dateable; in use in late 18th into 19th century) (B9/262); 13, Trombac ? English military button (505); 14, Trombac ? English military button (probably late 18th century) (148); 15, brass, 20 gage, same as 1 (288a); 16, copper pendant or button (B26/549); 17, large blue trade bead (184); 18, Alpha type brass button (444); 19, Trombac ? button, arsenic-treated brass with curvilinear flower design (109).

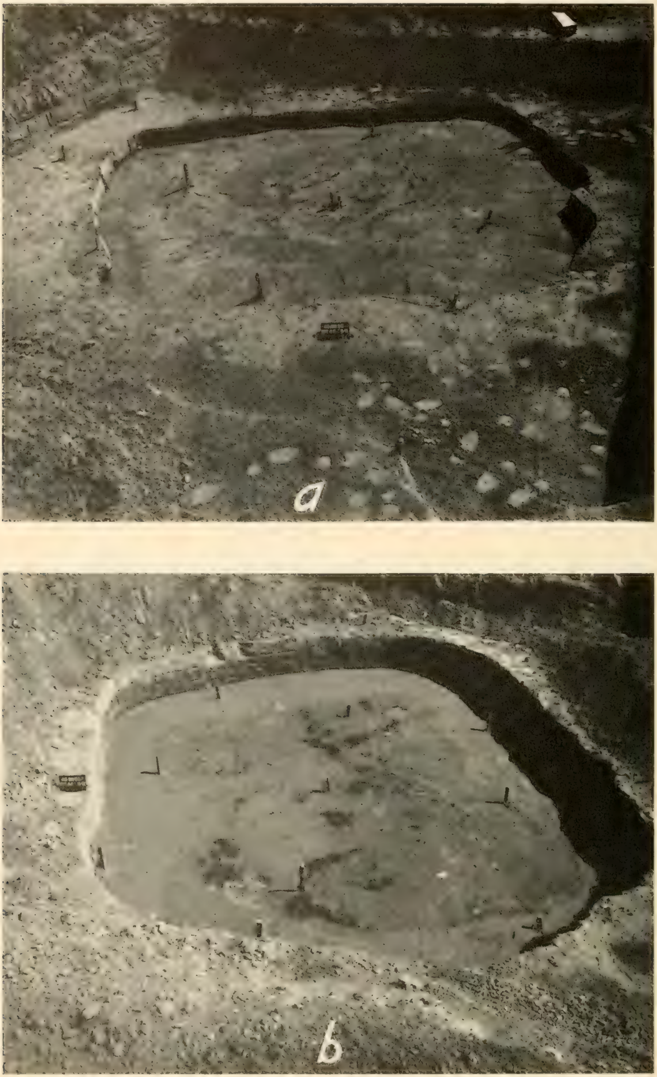
Site 45–BN–53.
(For explanation see p. 243.)

Site 45-BN-3.

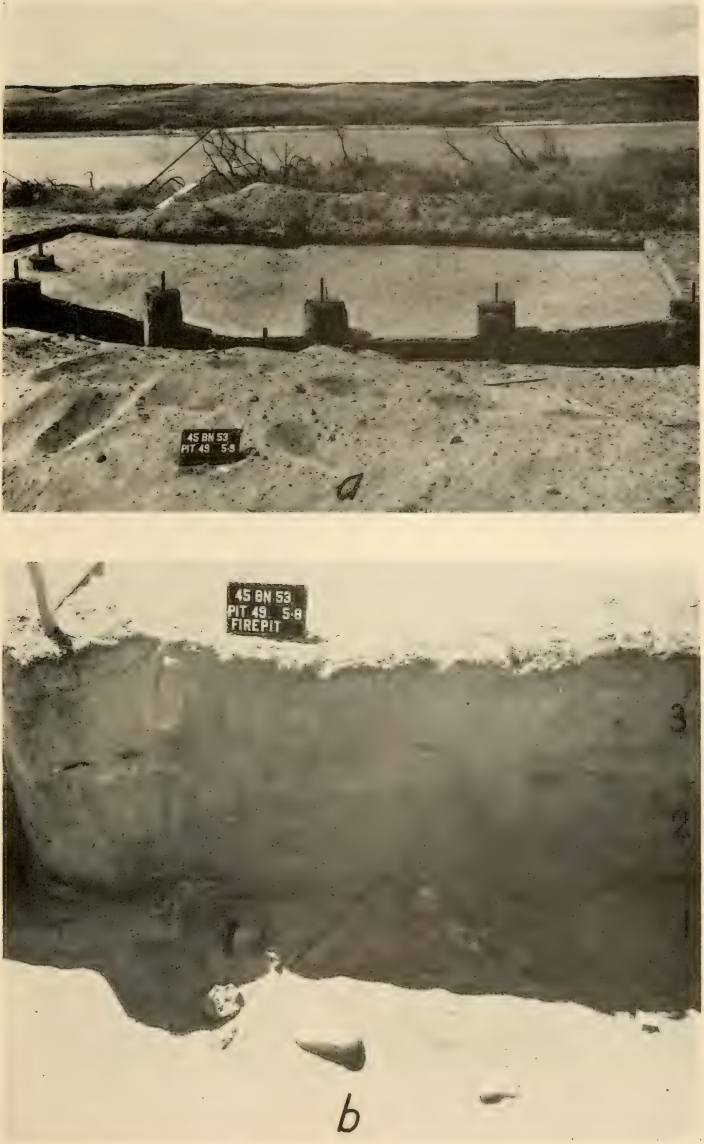
For explanation, see p. 243.)

Views of sites 45–BN–3 and 45–BN–53.

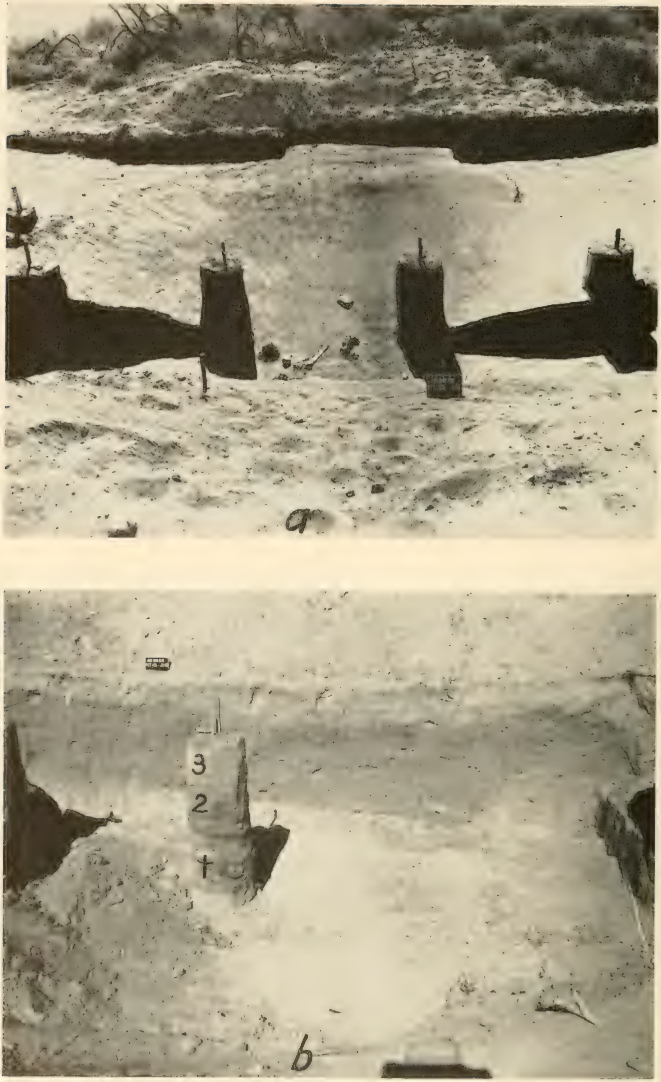
(For explanation, see p. 243.)



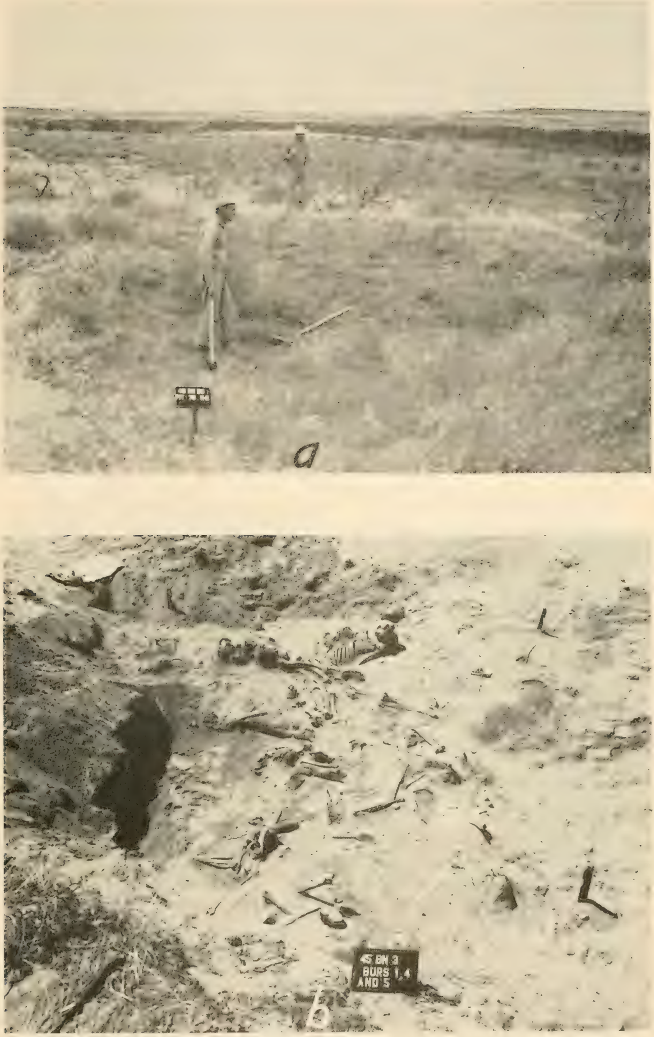
House pit 42, 45-BN-53.
(For explanation, see p. 244.)


45 BN 53
PIT 49 5-8
a
45 BN 53
PIT 49 5-8
FIREPIT
3
2
b

House pit 49, 45–BN–53.
(For explanation, see p. 244.)

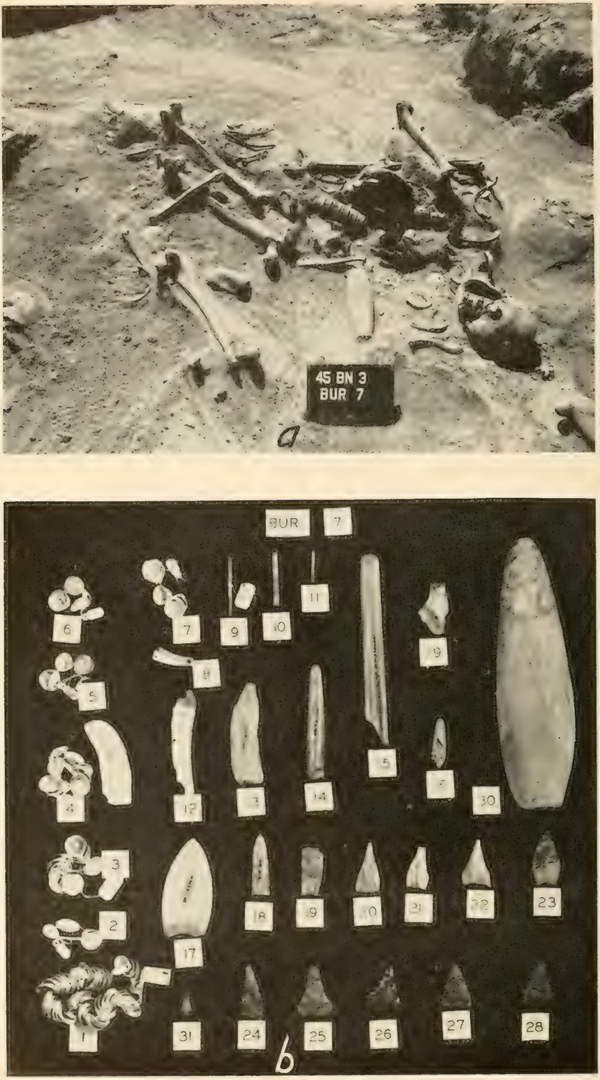


House pit 49, 45–BN–53.
(For explanation, see p. 244.)


a
45 BN 3
BURS 1,4
AND 5
b

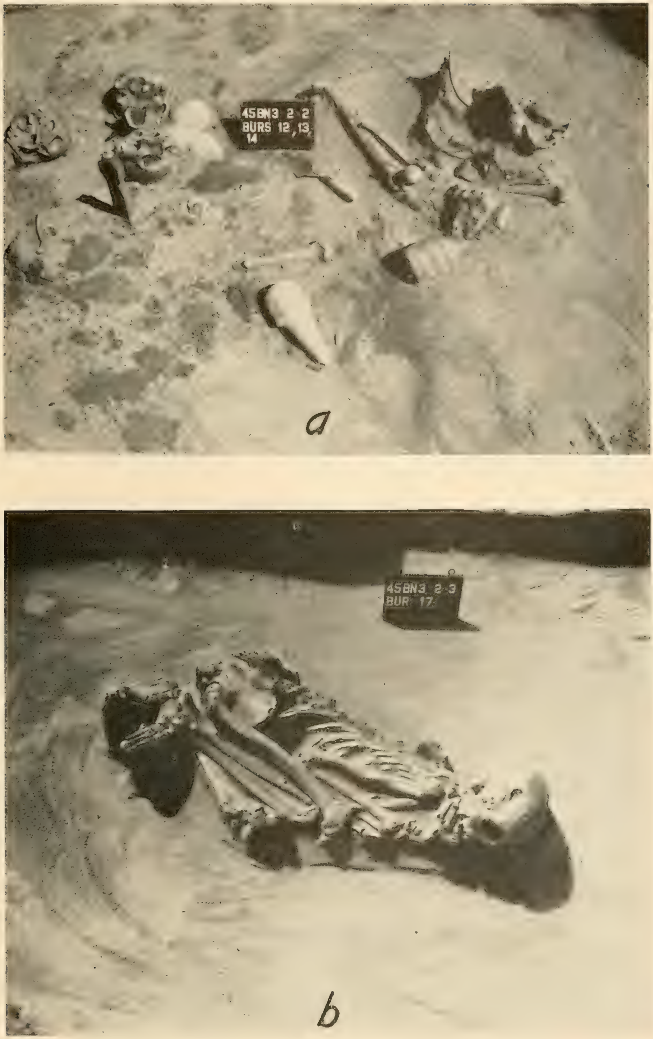
House pit 70, 45–BN–53; burials 1, 4, 5, 45–BN–3.

(For explanation, see p. 244.)


45 BN 3
BUR 7
a
BUR 7
6
7
9
10
11
19
5
8
4
12
13
14
15
16
30
3
2
17
18
19
20
21
22
23
1
31
24
25
26
27
28
b

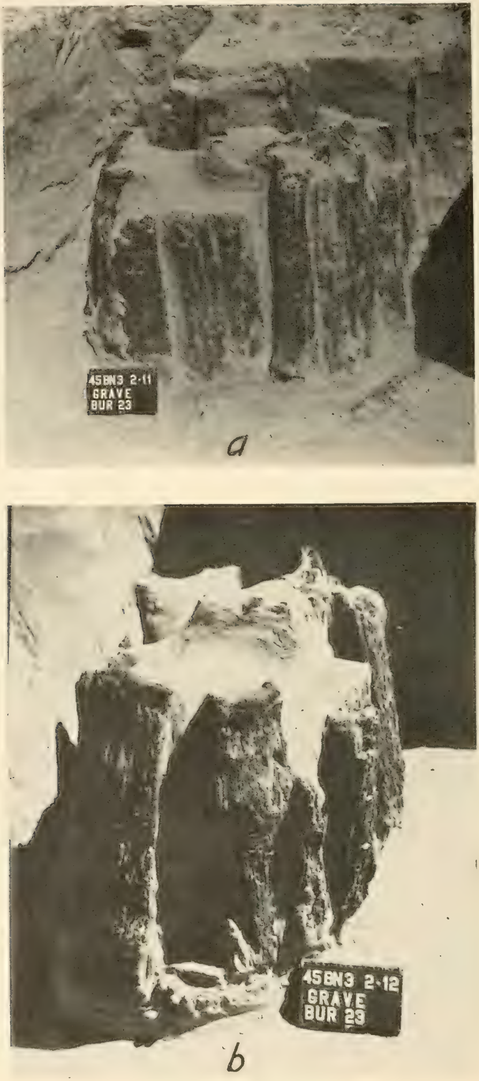
Burial 7 and accompanying artifacts, 45–BN–3.

(For explanation, see p. 244.)


45BN3 2-2
BURS 12, 13,
14
a
45BN3 2-3
BUR 17
b

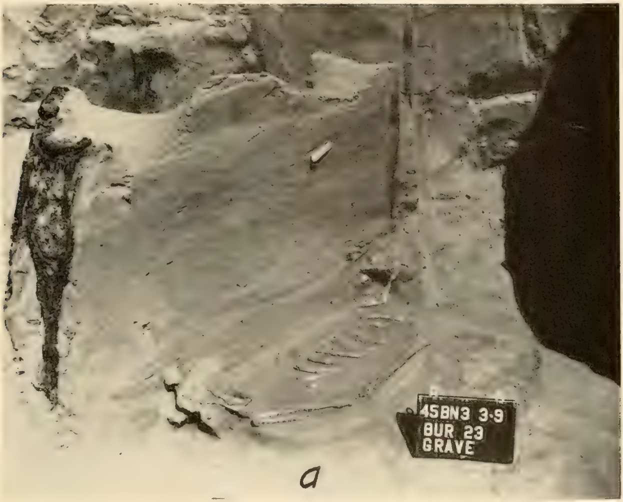
Burials 12, 13, 14; burial 17; 45–BN–3.

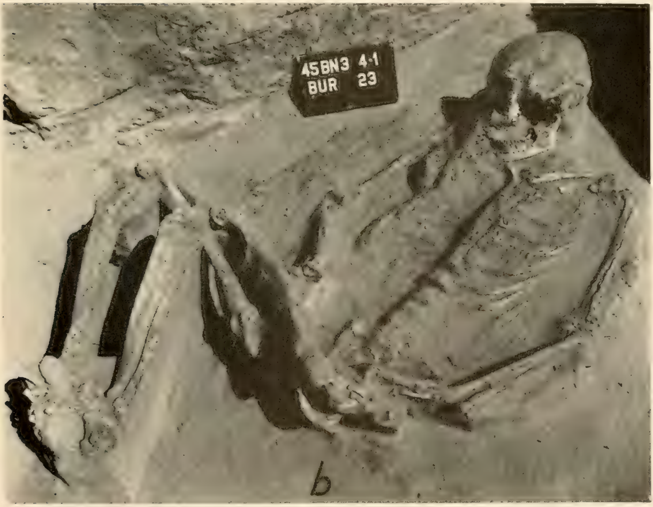
(For explanation, see p. 244.)


45BN3 2-11
GRAVE
BUR 23
a
45BN3 2-12
GRAVE
BUR 23
b

Burial 23, 45–BN–3.

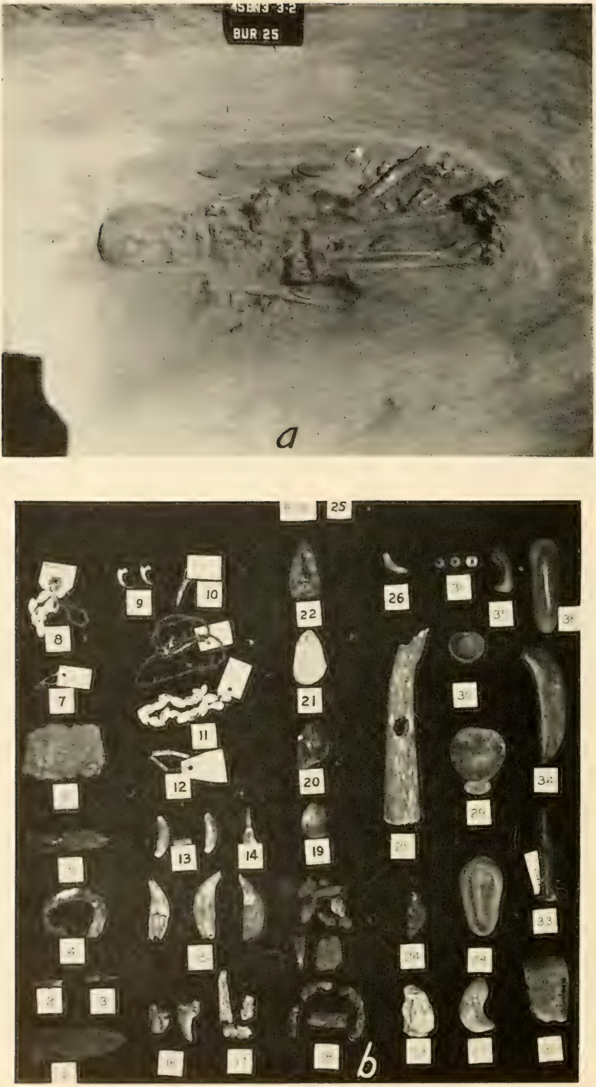
(For explanation, see p. 244.)


45BN3 3-9
BUR 23
GRAVE
a


45BN3 4-1
BUR 23
b

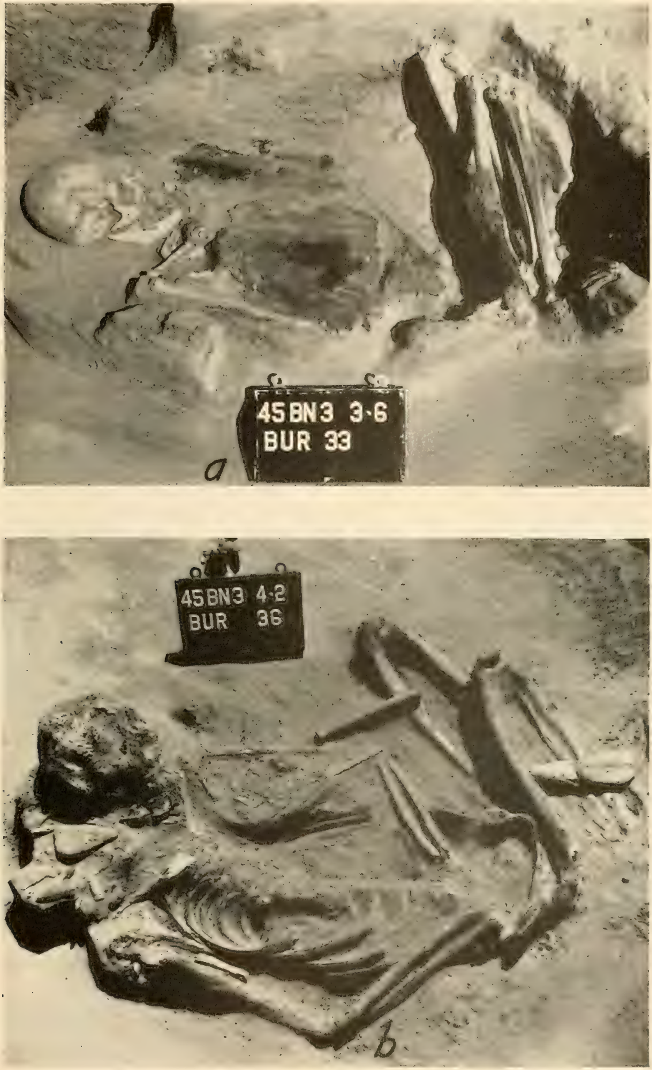
Burial 23, 45–BN–3.

(For explanation, see p. 244.)


45BN3 3:2
BUR 25
a
25
8
9
10
22
26
7
21
11
12
20
13
14
19
b

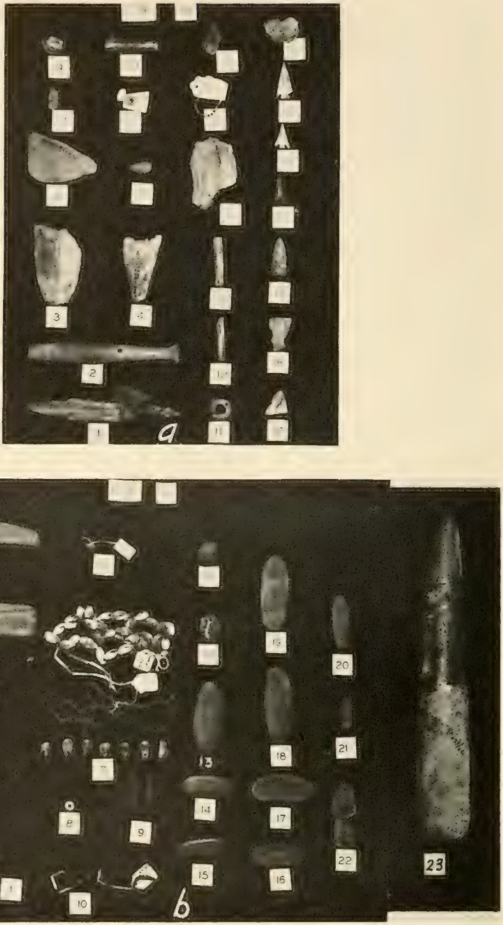
Burial 25 and accompanying artifacts 45–BN–3.

(For explanation, see p. 245.)


45BN3 3-6
BUR 33
a
45BN3 4-2
BUR 36
b

Burial 33, burial 36, 45–BN–3.

(For explanation, see p. 245.)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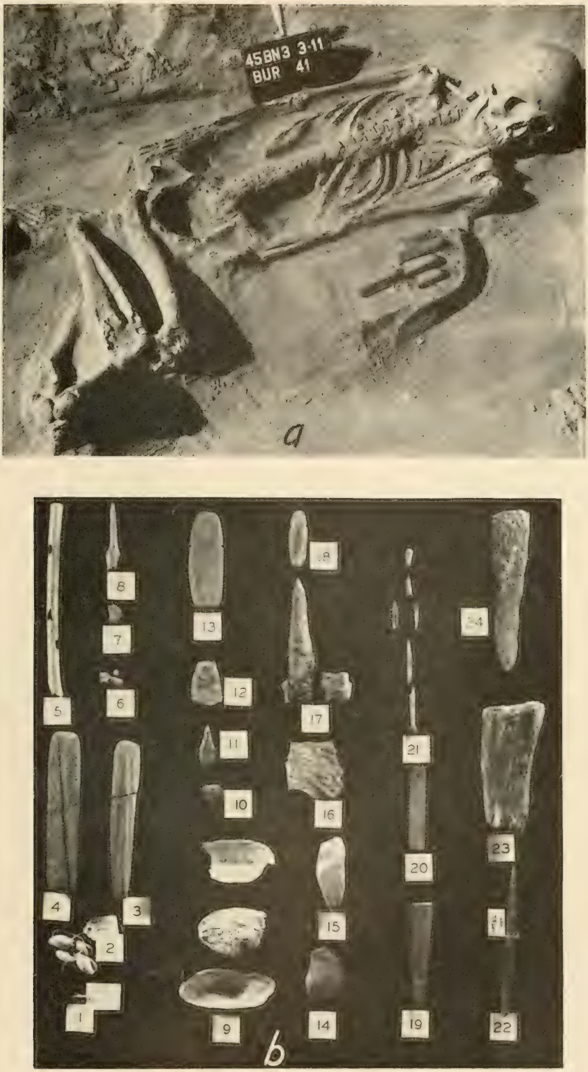
Artifacts accompanying burials 36, 39, 45–BN–3.

(For explanation, see p. 245.)


45BN3 3-11
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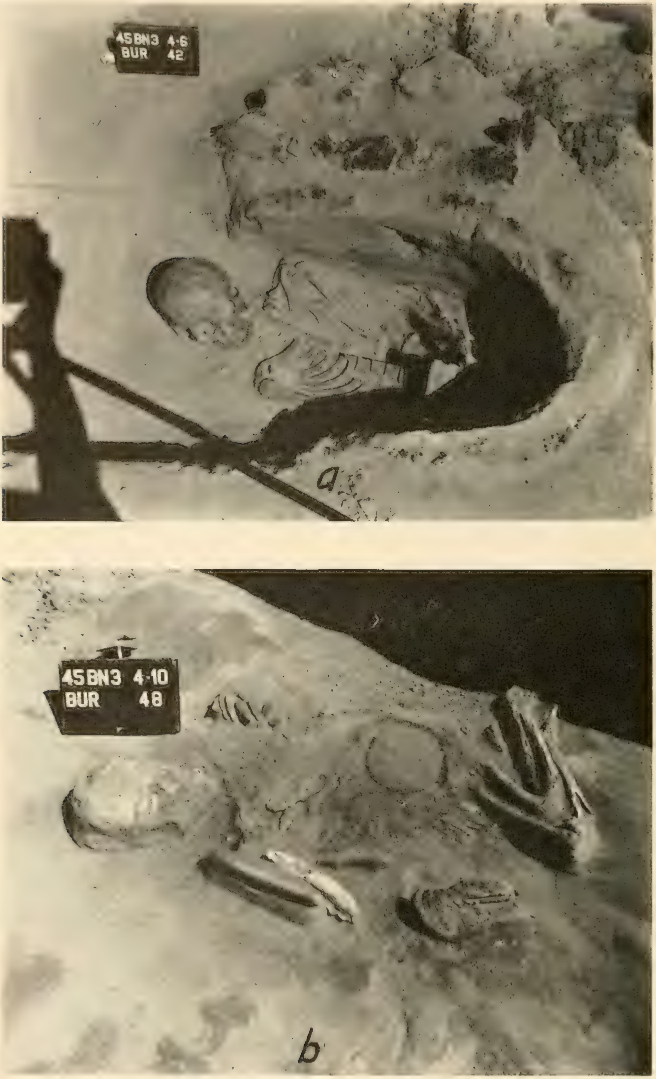
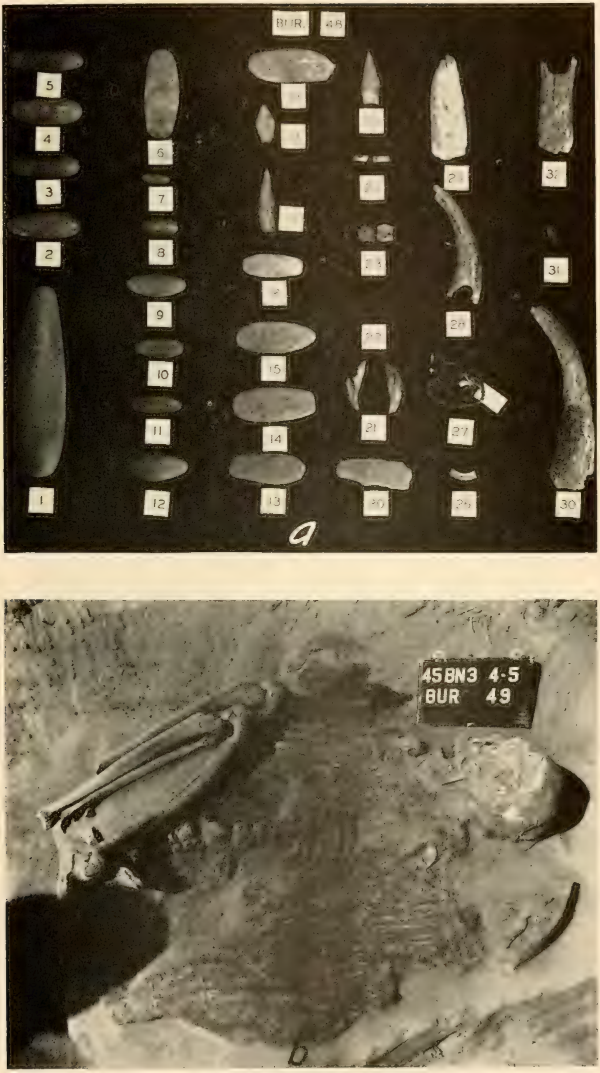
Burial 41 and artifacts accompanying burials 41 and 26; 45–BN–3.
(For explanation, see p. 245.)


45BN3 4-6
BUR 42
a
45BN3 4-10
BUR 48
b

Burials 42 and 48; 45–BN–3.
(For explanation, see p. 246.)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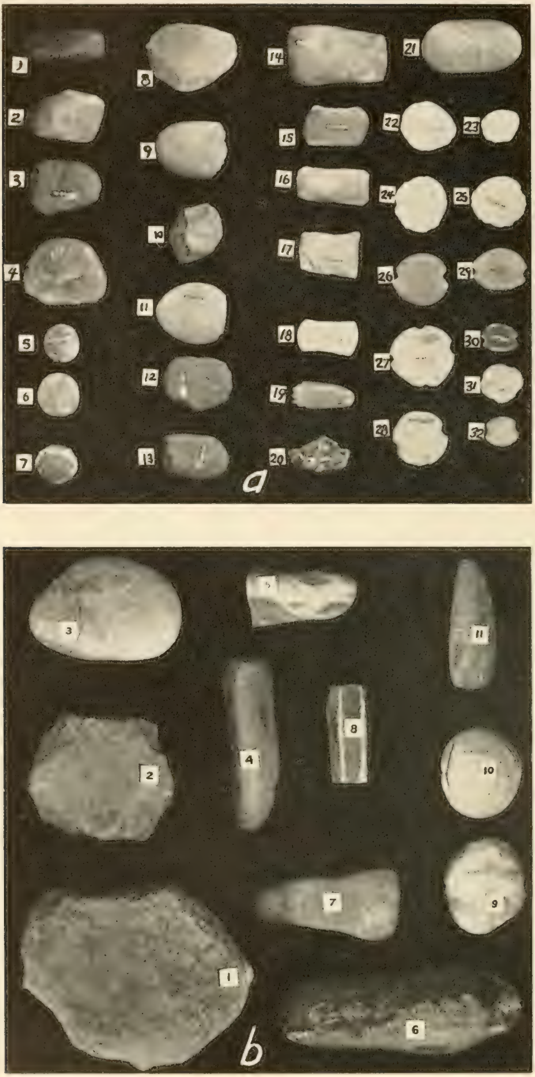
45BN3 4-5
BUR 49
a
b

Artifacts accompanying burial 48; burial 49; 45–BN–3.
(For explanation, see p. 246.)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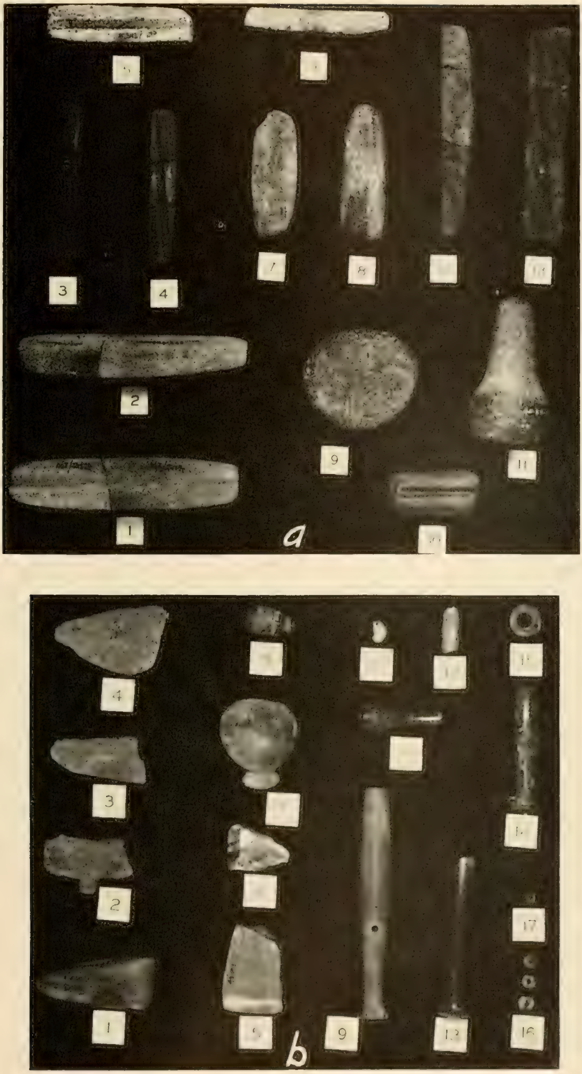
Stone objects of general utility from both sites.

(For explanation, see p. 246.)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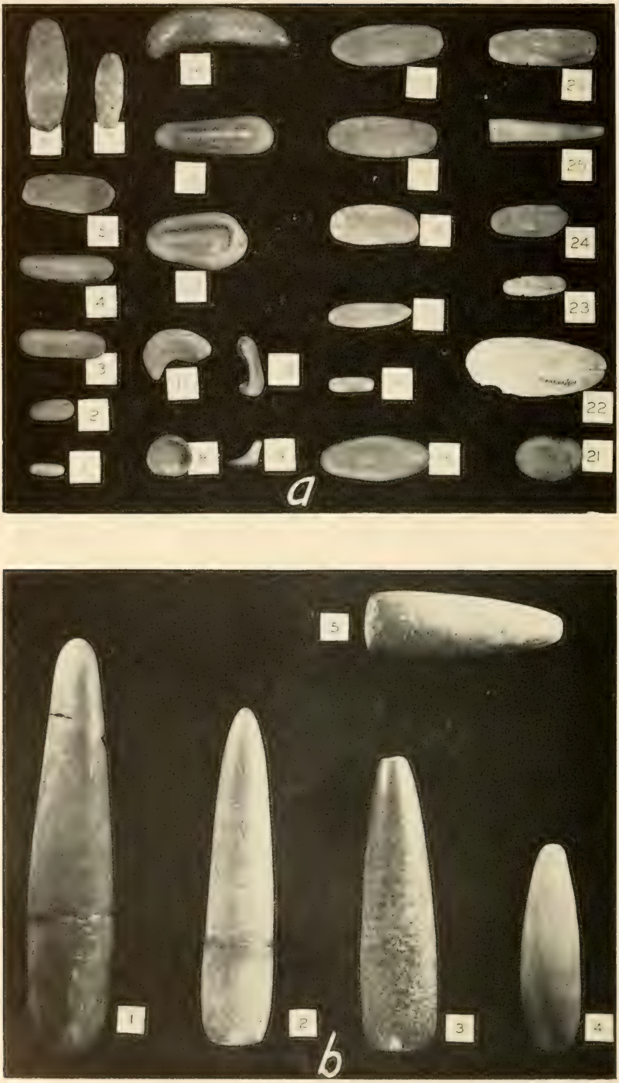
Ground stone objects from both sites.
(For explanation, see p. 246.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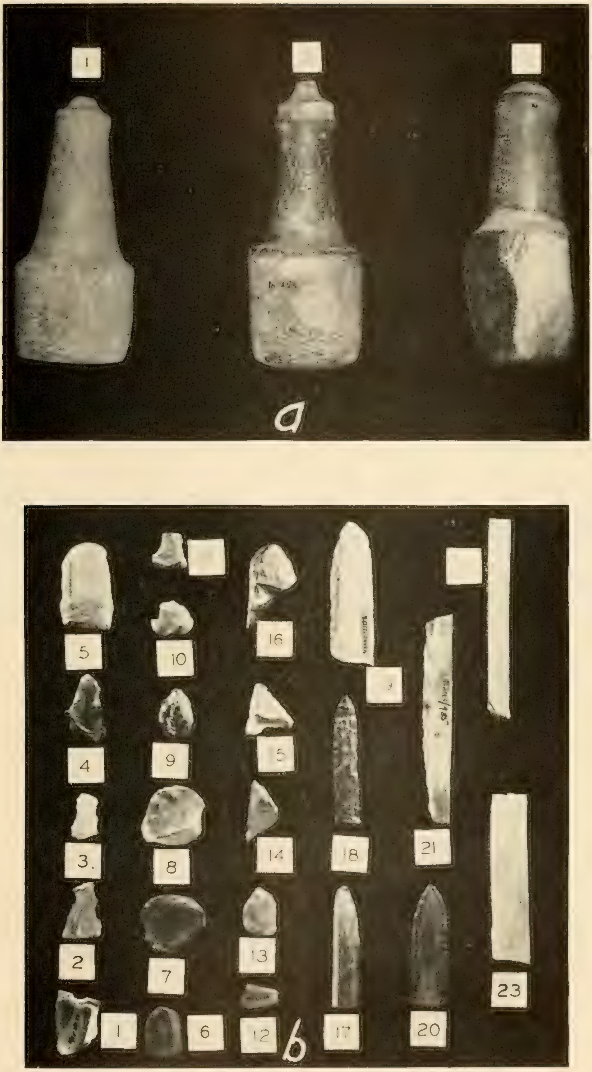
Effigies and lucky stones; pestles; 45–BN–3.

(For explanation, see p. 247.)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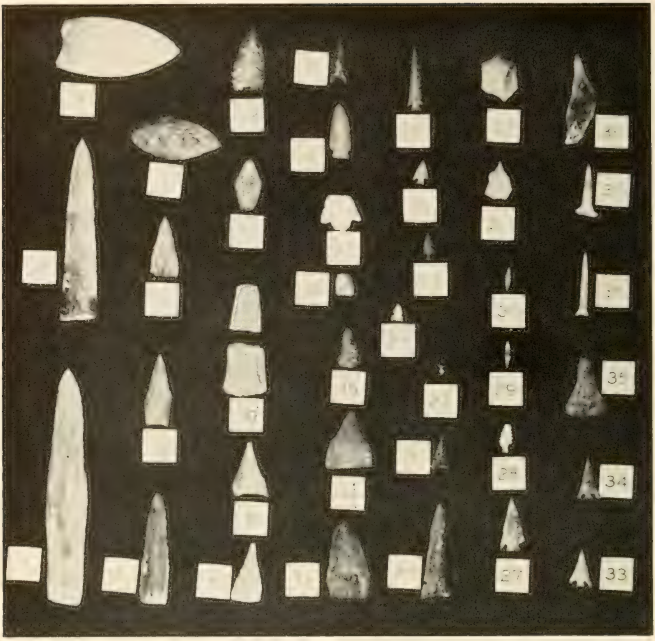
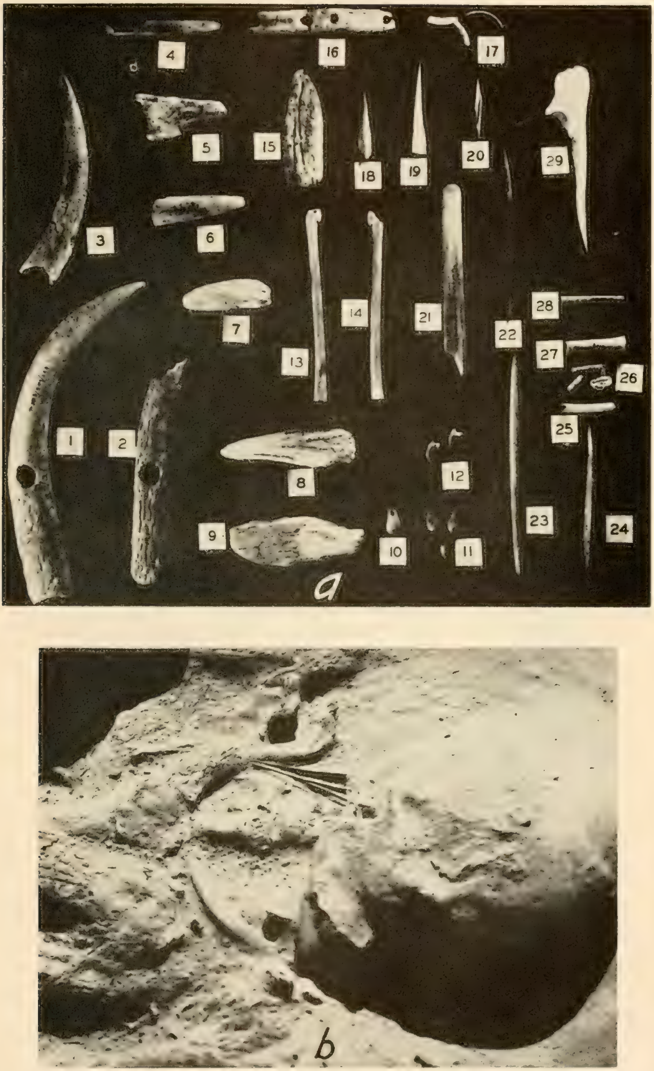
Mallet pestles; chipped scrapers and flakes from both sites.

(For explanation, see p. 247.)



Fine chipped stone from both sites.

(For explanation, see p. 247.)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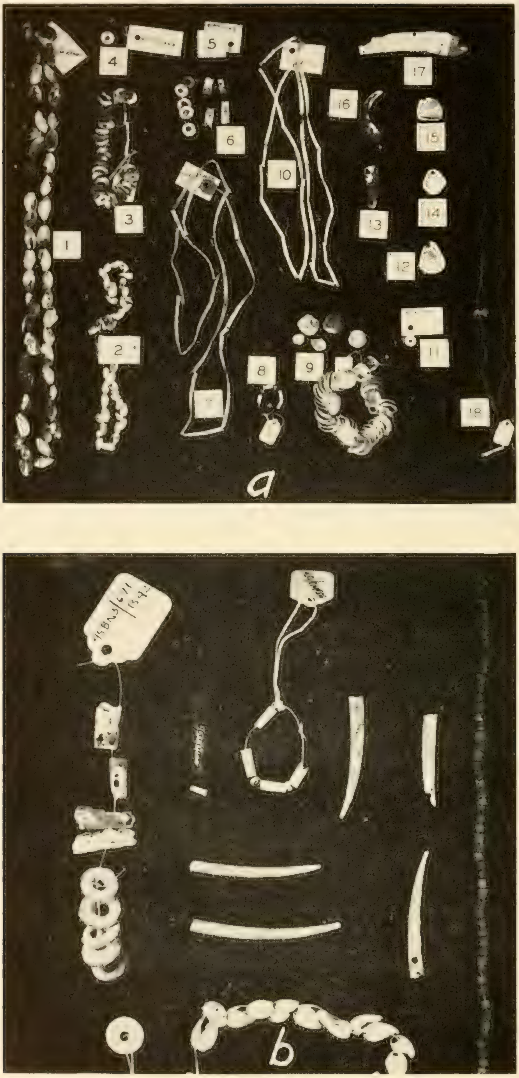
Antler and bone artifacts from both sites; skull, kingfisher bill, burial 24, 45–BN–3.

(For explanation, see p. 247.)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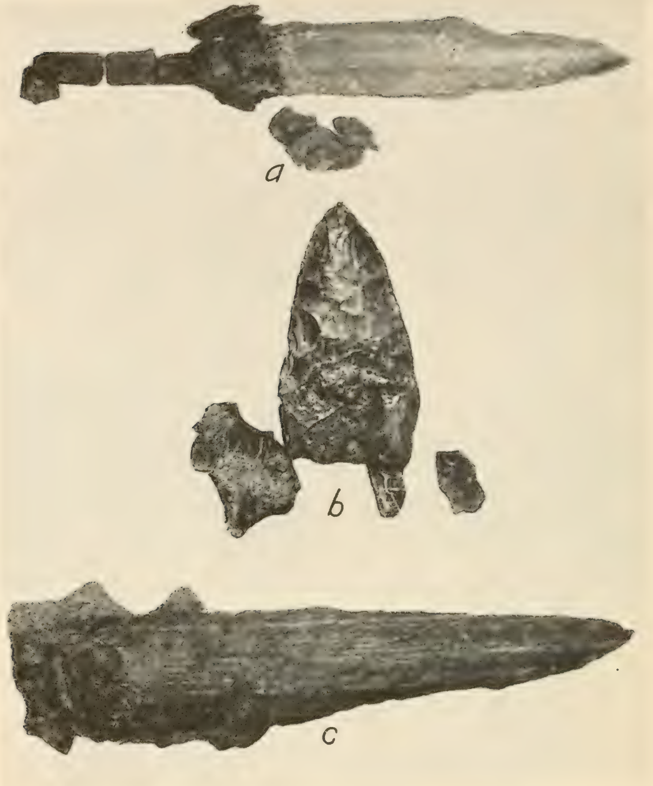
Shell and shell beads; 45–BN–3.

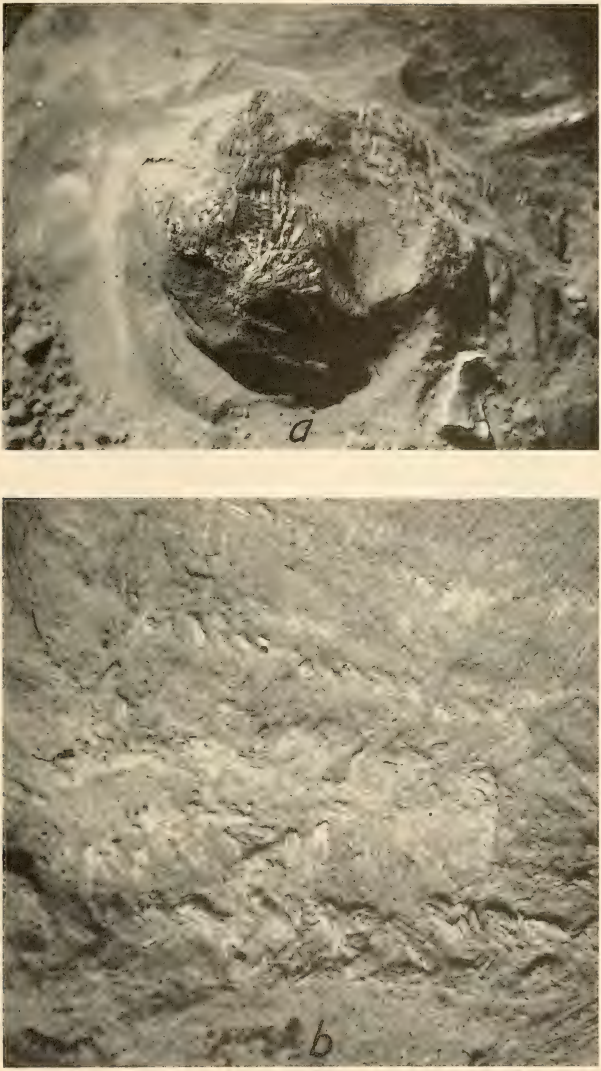
(For explanation, see p. 248.)

Perishable materials from both sites.

(For explanation, see p. 248.)

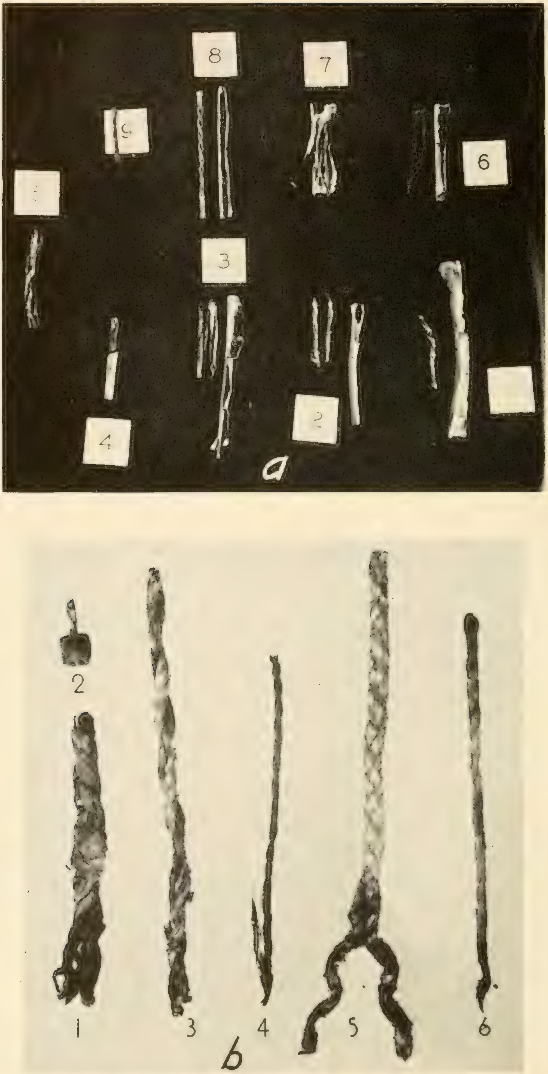


Hafted blades; 45–BN–3.
(For explanation, see p. 248.)



Basketry hat; twined matting; 45–BN–3.

(For explanation, see p. 248.)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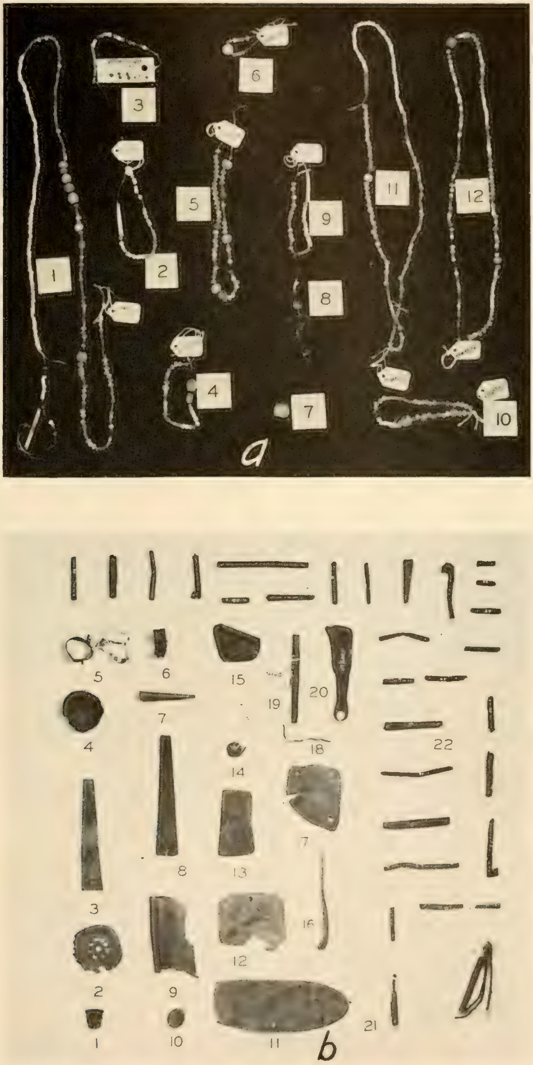
Copper beads and cords; cordage; 45–BN–3.

(For explanation, see p. 248.)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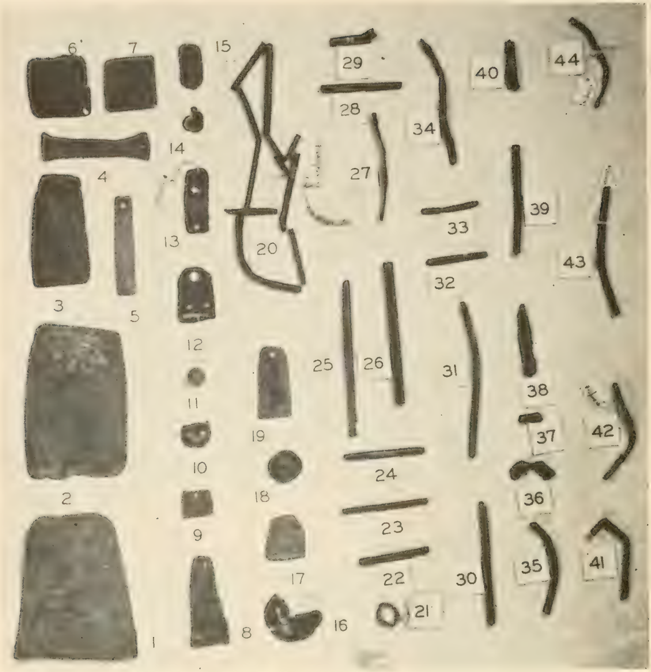
Trade goods; 45–BN–3.
(For explanation, see pp. 248–249.)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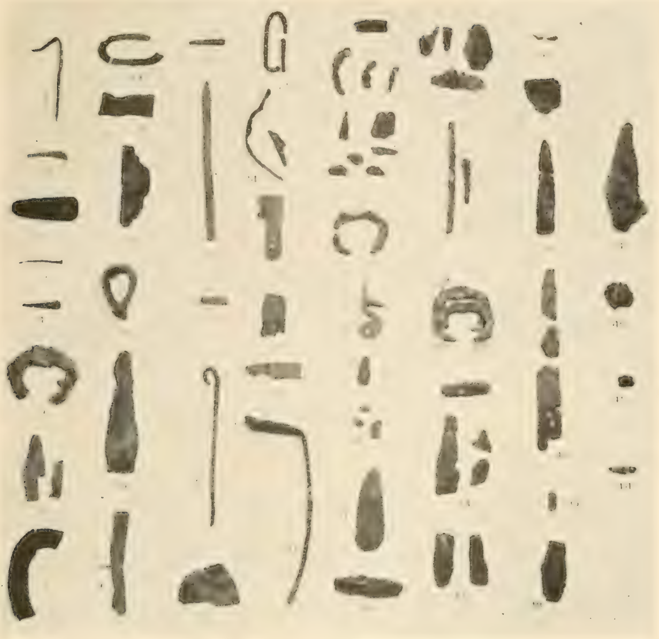
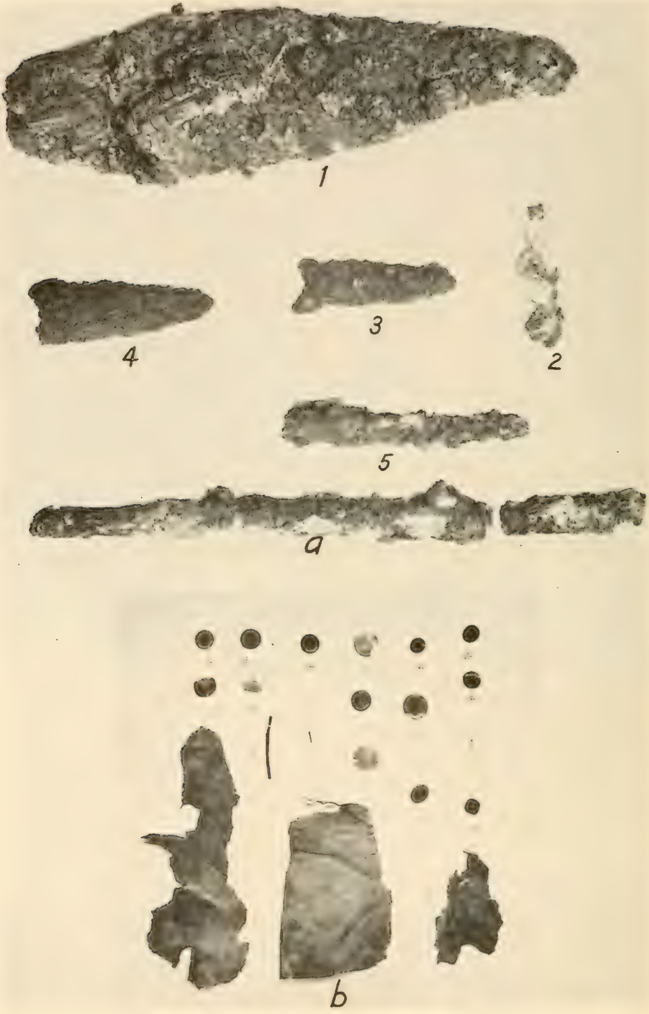
Brass and copper trade artifacts; 45–BN–3.

(For explanation, see p. 249.)



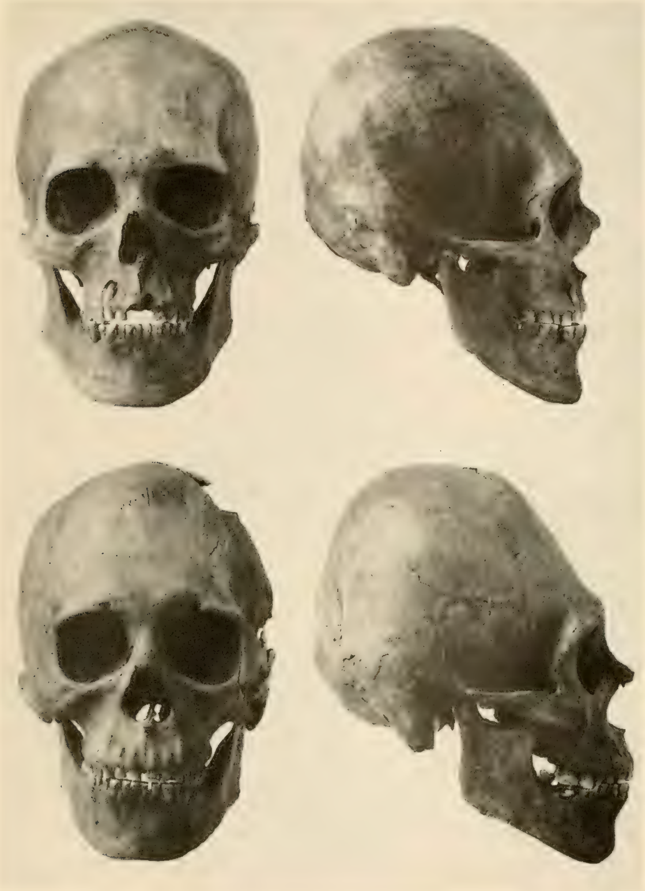
Ironware, 45–BN–3.

(For explanation, see p. 249.)

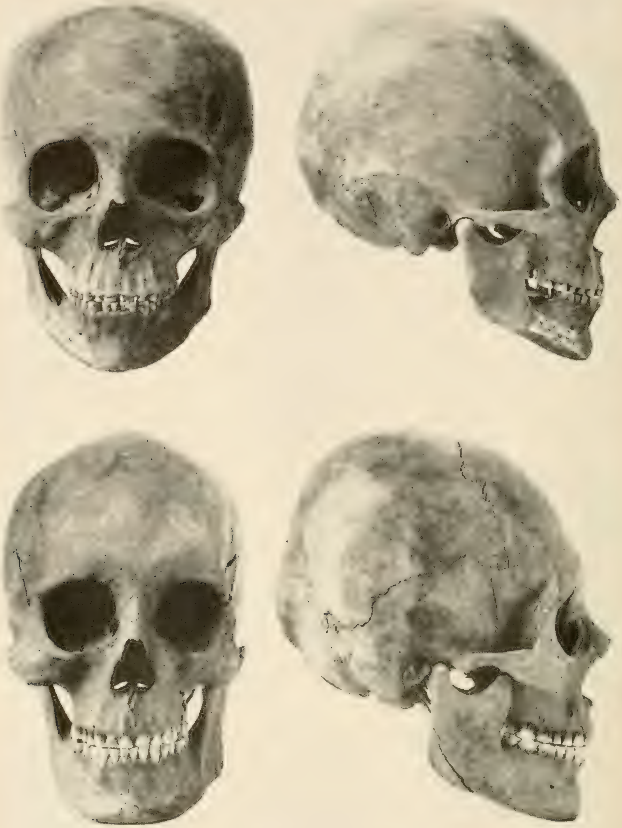


Ironware; sheet copper, brass, and buttons; 45–BN–3.

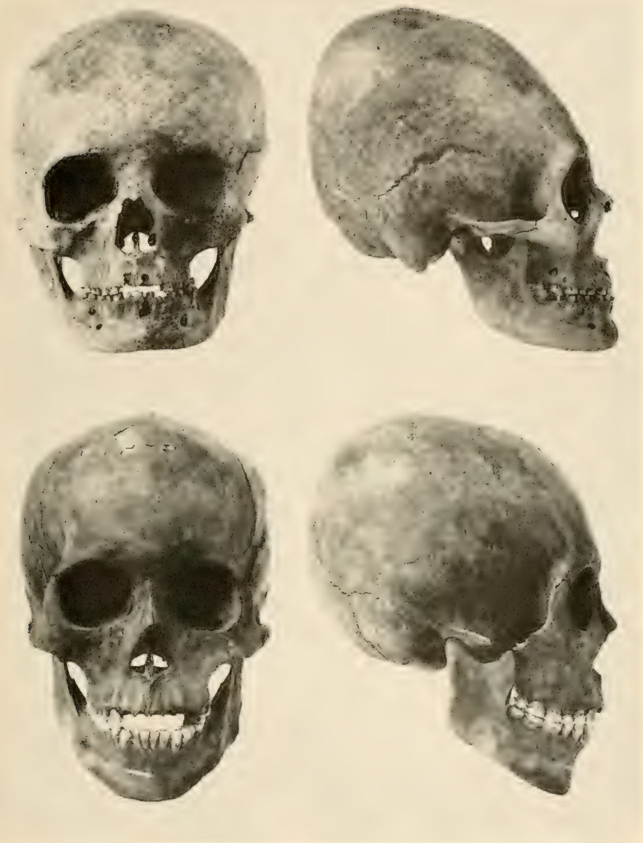
(For explanation, see p. 249.)



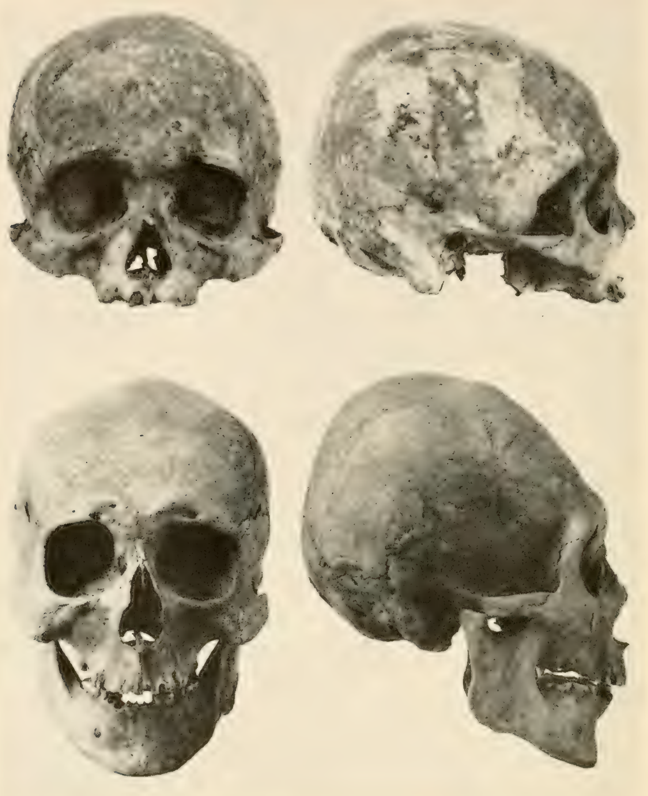
Berrian's Island skulls. *Upper*, No. 3, old adult male. Medium bi-fronto-occipital deformation. Length-breadth index [89.41]; nasal index 46.60. (See text, p. 212, for skeletal pathology.) *Lower*, No. 10, old adult male. Pronounced fronto-vertico-occipital deformation. No length-breadth index because of breakage. Nasal index 50.70. (See text, p. 212, for skeletal pathology.)



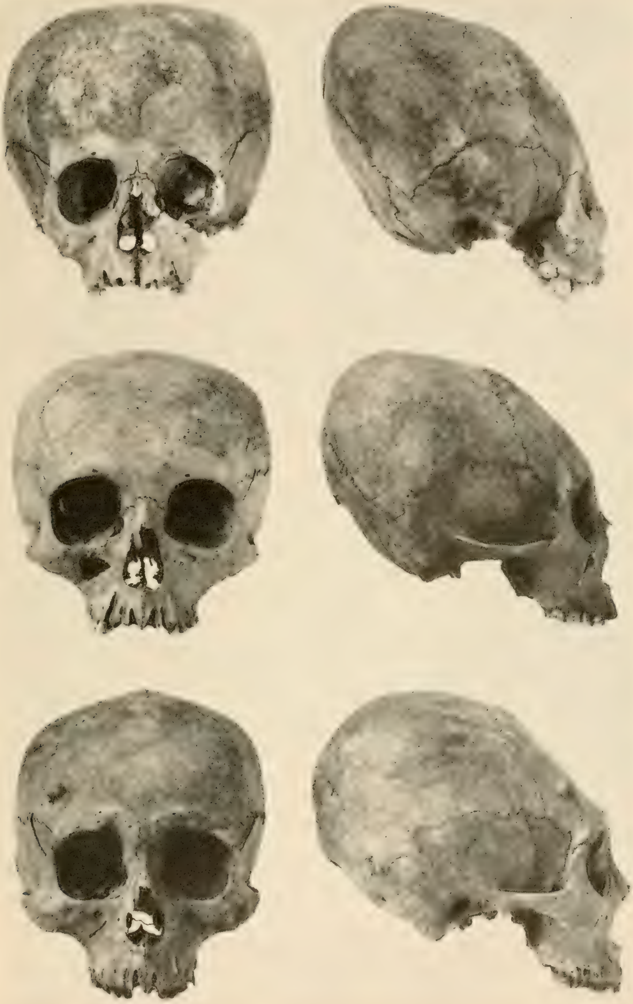
Berrian's Island skulls. *Upper*, No. 5, old adult female. Medium fronto-vertico-occipital deformation. Length-breadth index [84.76]; nasal index 47.06. *Lower*, No. 1, young adult male. Fronto?-vertico-occipital deformation of medium degree. Length-breadth index [84.12]; nasal index 46.60.



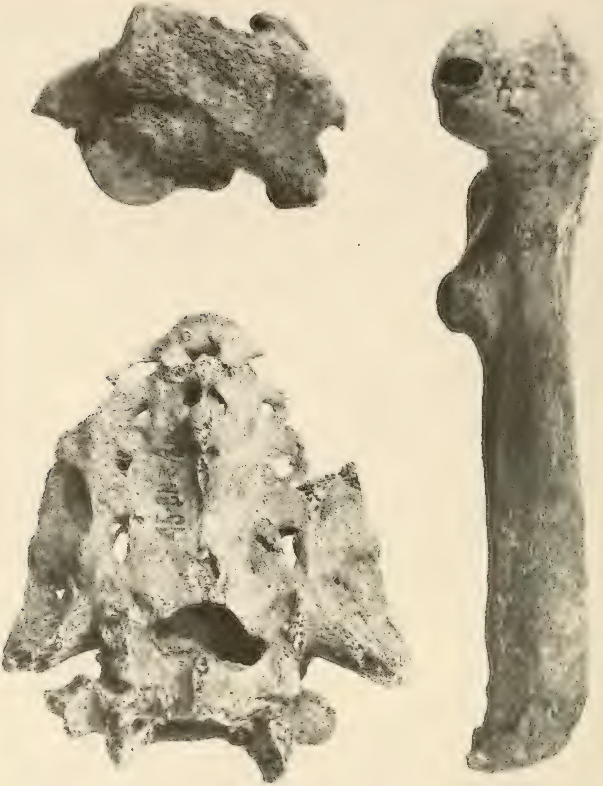
Berrian's Island skulls. *Upper*, No. 7, old adult female. Pronounced fronto-vertico-occipital deformation. Length-breadth index [93.83]; nasal index 47.92. (See text, p. 212, for skeletal pathology.) *Lower*, No. 11, subadult male (18–19 years). Slight to medium occipital deformation. Length-breadth index [84.80]; nasal index 42.69.



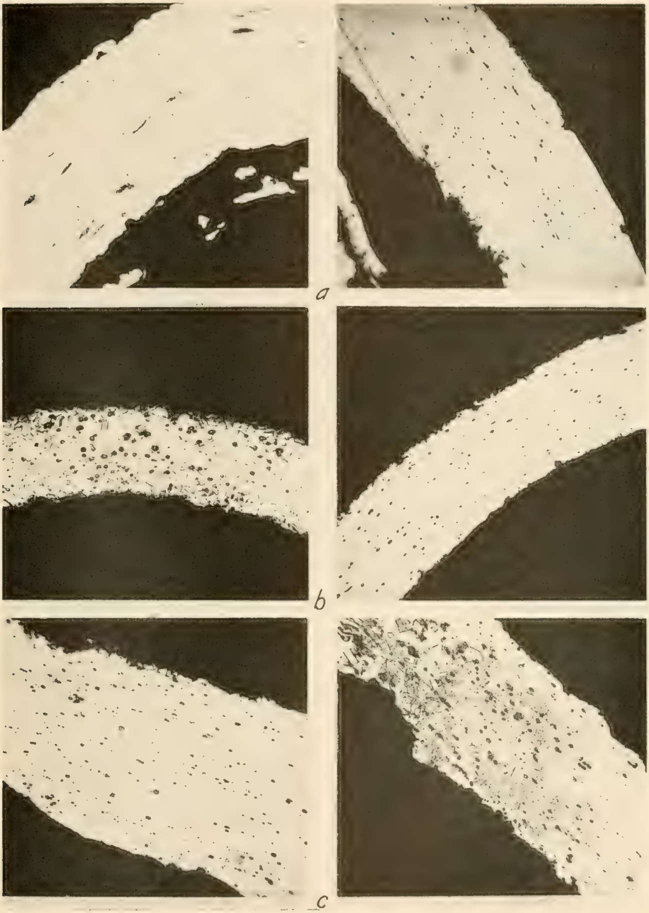
Memaloose Island skulls. *Upper*, USNM 374,012, male. Slight fronto?-vertico-occipital deformation. *Lower*, USNM 374,004, male. Pronounced fronto-vertico-occipital deformation.



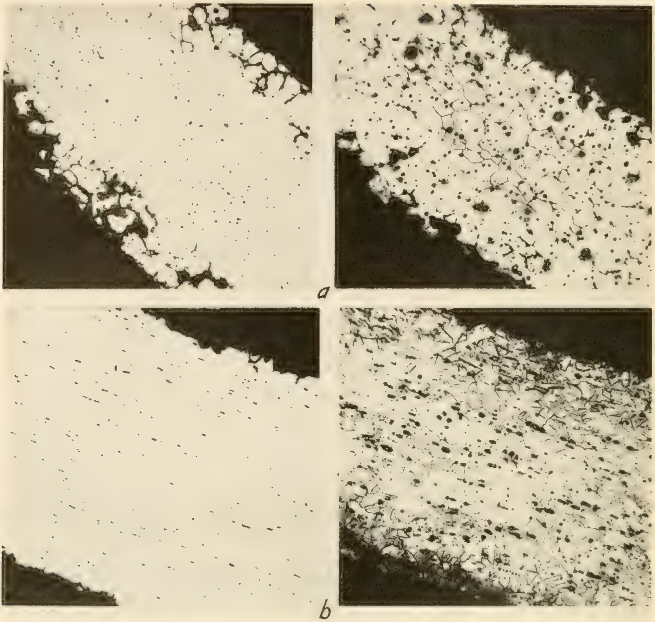
Memaloose Island skulls. *Upper*, USNM 374,028, child. Very pronounced parallelo-fronto-occipital deformation. *Middle*, USNM 374,021, female. Very pronounced parallelo-fronto-occipital deformation. *Lower*, USNM 374,009, male. Pronounced parallelo-fronto-occipital deformation.



Berrian's Island pathological bones. No. 10, with pathology tentatively diagnosed as an ununited femoral fracture, followed by metatstatitic osteomyelitis. *Right,* Left femur with nonunion. *Left, above,* Subastragalar fusion—right tarsals. *Left, below,* Ankylosis of sacro-vertebral articulation.



Photomicrographs of cross sections of copper objects. *a*, *left*, 61, unetched; *right*, 6, unetched. *b*, 63, *left*, etched; *right*, unetched. *c*, 153, *left*, unetched; *right*, etched.



Photomicrographs of cross sections of copper objects. *a*, 107, *left*, unetched; *right*, etched. *b*, 435, *left*, unetched; *right*, etched.

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